JOURNAL

OF THE

FRANKLIN INSTITUTE

OF THE

State of Pennsylvania,

DEVOTED TO THE

MECHANIC ARTS, MANUFACTURES, GENERAL SCIENCE,

AND THE RECORDING OF

AMERICAN AND OTHER PATENTED INVENTIONS.

JUNE, 1835.

TO THE COMMITTEE ON PUBLICATIONS.

GENTLEMEN,—In the January number of the Journal, a communication signed T. W. B. presents a supposed error from Arnott's Physics, in the following words,—"When any elastic body, as a billiard ball, strikes any other body larger than itself, and rebounds, it gives to that other body, not only all the motion which it originally possessed—this being done at the moment when it comes to rest—but an additional quantity, equal to that with which it recoils."

This he considers erroneous, and contends "that when any elastic body strikes any other, larger than itself, and rebounds, it does not give to that other all its motion, by just so much as it does rebound."

It will be admitted by your correspondent, that, if an elastic body strikes an *equal* body at rest, it communicates all its motion to the other, and remains at rest after the stroke; and that in this instance, at least, the striking body has communicated all its motion "at the moment when it comes to rest." Let the same elastic body strike against a smaller one, and I contend that it will not impart all its motion, by just so much as it *retains;* that is, it will continue moving forward, though with less velocity, after the stroke."

Now, it is clear that this result is not the same as that in which the body struck was larger than the striking body; and it is equally evident that, when the stricken body rebounds, it imparts more motion than when it merely comes to rest, (or more than all it possessed, by just so much as it recoils,) and more when it remains at rest than when it continues moving forward, after the impact.

This is unquestionably true, as regards the *motion* of bodies; but

let it be observed, that the *motions* and *forces* of bodies are distinct things, and must be estimated by different standards of measure; in other words, the "momentum," (quantity of motion,) and the "power,"* are the products of different elements: the former, of the *quantity of matter*, multiplied into its *velocity*—and the latter, of the *degree of force*, into the *distance* through which it is exerted.

Two bodies may possess equal *momenta* and equal *power*, or they may have equal momenta and *unequal* power. An example of the first case is presented when two equal bodies, having equal velocities, meet; for they arrest each other's motion, and they exert equal degrees of force on each other, through equal distances.

The second case is shown when two unequal bodies, whose relative velocities are inversely as their quantities of matter, impinge upon each other; for, as in the former case, they arrest each other's motion, but do not exert their mutual forces, (which are equal,) through *equal distances*, but through spaces proportionate to their respective velocities.

Now I maintain that, in every case of impact, there must, of necessity, be more or less yielding of the impinging bodies, after they first come into contact; and, consequently, that they continue for a time to move towards each other, although their action may appear to be instantaneous. This being admitted, and their mutual forces being of equal intensity, it follows that the body which *passes over the greatest proportion of distance* during the conflict, performs, in the same proportion, the greater share of the *labour* of the operation.

For example, the body A, whose mass is 1, with a velocity of 2, meets the body B, whose mass is 2, with a velocity of 1; the bodies being soft, remain at rest after the stroke, proving that A had just as much motion as B; but as they retain their relative velocities to the last moment of their motion, A necessarily travels twice as far as B, or two-thirds of the distance passed over between them; showing that the quantity of force of A was twice as great as that of B.

The motion of a body and its force differ essentially in this, that the latter has no existence, (as a force,) only during a change in the former; that is to say, a body in a state of rest does not possess this force in any particular direction, as then it would require to be retained by the aid of force; nor does it, as some learned authors assert, constantly exert this force in every direction, since such a distribution of force, would leave the body without any power to resist an impulse, just as if no such force existed.

Again: a body in a state of uniform motion, is as perfectly passive as when at rest; for the effect of force in any direction, would be instantly to produce a change, and if in all directions, to neutralize itself.

I have avoided, in this discussion, the use of the term "vis-inertia," to distinguish that force of matter by which it resists a change of motion, for the reason that *force of passiveness* is a contradiction of

* By the power or quantity of force possessed by a moving body, I would be understood, so much as is due to its velocity, or what it will exert in coming to a state of rest, and not as having any reference to the absolute force; that being unlimited, either in degree or quantity.

terms, conveying to some minds the idea of force, and to others its opposite, and thus embarrassing the student in a subject in itself sufficiently obscure and intricate; although I confess myself unable to find a term exactly suited to express the distinguishing quality of that force, inasmuch as it is either active, or passive, according to circumstances. Hence the name "vis-inertia," which, if the "vis" were always retained, is perhaps more expressive of its true character than any other term.

If, however, as is very often the case, the "inertia" is to be taken as expressive of the thing itself, instead of its peculiar *quality*, a more unsuitable term could not be found, since it conveys the idea of the *absence* of the force in question.

Now, as this force is a *something*, which is sometimes *nothing*, and cannot be clearly designated by *anything*, suppose, for the sake of avoiding the perplexing tendency of the term "inertia," we amend the word, by substituting for *r*, the letter *p*, and call it what it is, in fact, *ineptia*, *vis-ineptia*, or *queer* force.

Some excellent mechanics understand "inertia" to mean a property of matter, by which it endeavours to maintain a state of rest—and *momentum* to be of an opposite character; some contending that momentum is of the nature of *force*, and "inertia" of *passiveness;* while others of high respectability reject the idea of force, of "inertia," and momentum, altogether.

Dr. Young supposes that the "inertia" of matter "cannot be a force," because, if it were, it must be of some definite quantity in a given body." Let us apply this rule to the other forces of matter, gravitation and repulsion; are either of these acknowledged forces of any definite quantity (degree) in a given body? Certainly not; for, like *ineptia*, both are *conditional, depending on the reciprocal action of something else*, and thereby *subject to variation in any degree;* the one depending for its *existence*, upon an opposite force, and upon the *degree* of that force, for its *intensity, or degree;* the others depending for their *existence*, in matter, upon the *existence* of other matter, and for their *degree* upon its *proximity*.

To those who allow to matter the power of occasionally exercising *force*, and still, like your worthy correspondent, confound the laws of *force* and *motion*, I would urge the propriety of considering force in its most general sense—as being always the same thing, (under whatever circumstances,) subject to the same general law, of acting always equal and opposite to *force*, and characterised by its power of changing the motions of bodies, and of producing other mechanical effects. Let it be taken, in its connection with matter, as entirely unaffected by the mere circumstance of motion, which, after all, is only a change of place, and often only apparently so.

No condition of the motion of a body can at all affect its power to resist a force impressed upon it, either in kind or degree, its resistance being always equal to the force impressed, whether employed in retarding or accelerating, arresting or generating, motion.

For example, a cannon ball, shot directly upward, would, if unresisted, preserve a uniform velocity in the same direction, unaccompa-

nied by *force* of any sort, (in other words, retaining its *power* to exert a *force* when called for,) forever. But if, at any time, the force of gravitation should begin to act, the ball would then exert its *ineptia* upward, *equal* and *opposite* to gravity, and thus it would continue *through all the change of the ball's velocity and direction*, until its final return to the earth; affording, by the way, the true rationale of retarded and accelerated motion, by a constant force.

Having established a proper distinction between *motion* and *power*, it is easy to explain to so intelligent a reasoner as T. W. B., wherein he has mistaken the matter. Had he asserted that, "when any elastic body strikes another body larger than itself, and rebounds, it does not give to that other body all its *power*, by just the quantity with which it rebounds," he would have stated the fact; for whilst the *momentum* of a given body is in the simple ratio of its velocity, the *power* is in the ratio of the *square* of the velocity, and the sum of power possessed by the bodies after the stroke, will be the same (whether the body struck be larger or smaller) as that originally possessed by the striking body; that is to say, when the body struck is *smaller*, and does not receive all the motion of the other, the sum of the products, of their quantities of matter, multiplied into the *squares* of their velocities respectively, after the stroke, will be the same as when it is *larger*, and causes the striking body to recoil, or when they are *equal*, and the striking body remains at rest after the impact.

It is a well known law of falling bodies, that their distances passed over are in the ratio of the *squares* of their velocities; and experiment proves that, if a body is let fall upon an elastic table, it will rebound to the height from whence it fell; showing that the power employed in giving the body velocity, and that employed in taking it away, is proportionate to the square of that velocity.

It was not my intention to have gone so far into the subject; but *receiving the impulse from a powerful body, and meeting but little resistance from gravity*, and following implicitly the *laws of motion*, I have *passed over a reasonable quantity of matter*, (taking the *distance*, instead of the *velocity*, as the *standard of measure*,) by the mere *vis-ineptia*.

Respectfully,

RUFUS TYLER.

FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

On the Evidence of Certain Phenomena. *By* W. C. REDFIELD.

The "Notes of an Observer,"* containing some strictures on two papers relating to meteorology, which are found in the twenty-third volume of the American Journal of Science, are doubtless entitled to notice from the writer of this article, which would have been more promptly given, had those strictures met his eye at the time of their publication; but he had, unfortunately, no knowledge of their ap-

* Journal of the Franklin Institute, vol. xiii., p. 9.

pearance, till a few days since, when chance brought them under his observation.

The intelligent writer of the notes introduces his strictures on the two papers alluded to, by the following remarks:

"They contain a most laborious collection of facts, which, if well authenticated, will be of immense importance to meteorological science. Some of them, however, are so anomalous, and inconsistent with received theories, that I hesitate to put entire confidence in them, and shall continue to doubt until I have the most certain evidence of the facts."

As was partially intimated in those papers, circumstances do not permit me to set forth in detail the great mass of evidence and authorities by which the statements in those papers are sustained, or even to such an extent as I deem to be highly desirable. It does not, however, seem necessary that facts in this department of science should be rejected, or even doubted, for no better reason than being "inconsistent with received theories;" for while, in the present improved state of physical science, we are so justly rigid in demanding correct inductions from well observed or established facts, before we consent to give credence to *new* theories, it may be well, perhaps, to inquire when, and in what manner, the "received theories" in meteorology have been demonstrated to be true. That the theories in question have long been received, and that they influence and control our modes of thinking and reasoning on these subjects, is doubtless true; and it is believed that the latter often happens, too, in the face of much positive evidence of their fallacy. Nor is such a mental process at all uncommon, even in this age of the exact sciences, and I have had occasion to see the most unsupported and conjectural hypotheses adduced by able writers, as satisfactory disproof of a series of well observed facts. But to return to the "Notes of an Observer," who proceeds to particularize his exceptions as follows.

"For example: In p. 132 he says, 'In large portions of the Pacific Ocean, the tides are exempt from the lunar influence. At Tahiti and the Georgian groupe, near the centre of the Pacific Ocean, the tide rises but one or two feet, and it is high water at noon and midnight throughout the year, and this, too, in the very region where the established theory would lead us to expect the lunar tides to be the most regular and powerful.' Again, in p. 128, he says: 'In Peru, at the height of 18,000 feet, the wind has been found to be fresh from the south-west,' meaning, if I understand the whole paragraph, that this is the prevailing direction of the wind at that place."

Without inquiring whether the closing inference here quoted be justly warranted by the paragraph to which he alludes, I have to remark that it is *possible* that my statement in regard to the tides at the Society Islands, and certain other parts of the Pacific, may prove not to have been sufficiently guarded. We should naturally think that, even in the absence of such lunar influence, the momentum of the tides from other portions of that great ocean would necessarily affect the equilibrium of the surface at these islands; and Prof. Whewell,

in his able elucidation of the cotidal lines, has given the time of high water at these islands, without any direct intimation of such phenomena. But, on the other hand, we have the authority of gentlemen who have been attached for many years to the English missions at these islands, and who, from their known habits of life, must be supposed to be thoroughly conversant with the facts of the case, in support of the statement which I have made. The following statement of the Rev. William Ellis, one of the gentlemen alluded to, and who has returned to England, may be found in his Polynesian Researches, at p. 28-9, vol. i. of the second London edition.

"Among the natural phenomena of the South Sea Islands, the tide is one of the most singular, and presents as great an exception to the theory of Sir Isaac Newton, as is to be met with in any part of the world. The rising and falling of the waters of the ocean appear, if influenced at all, to be so in a very small degree only, by the moon. The height to which the water rises, varies but a few inches during the whole year, and at no time is it elevated more than a foot, or a foot and a half. The sea, however, often rises to an unusual height, but this appears to be the effect of a strong wind blowing some time from one quarter, or the heavy swells of the sea, which flow from different directions, and prevail equally during the time of high and low water. But the most remarkable circumstance is the uniformity of the time of high and low water. During the year, whatever be the age or situation of the moon, the water is lowest at six in the morning, and the same hour in the evening, and highest at noon and midnight. This is so well established, that the time of night is marked by the ebbing and flowing of the tide, *and in all the islands the term for high water and midnight is the same.*"

A fact which is thus substantiated, and which has become incorporated into the very language of a whole people, it would be difficult to call in question. It is supported also by the testimony of Messrs. Tyerman and Bennett, in their Journal of Voyages and Travels,* to say nothing of facts collected from other sources, or which have the same bearing, though relating to other regions. I will mention, however, that Mr. Whewell quotes the observation of Capt. Beechy, that at Papiate, one of the Society Islands, it is high water *every day* at half an hour before noon, and low water at six in the evening; and he also informs us that Lieut. Malden (Lord Byron's voyage) gives a similar account of the tides at Owhyhee, situated in a corresponding latitude and position in the *northern* Pacific. In the last number of the American Journal of Science,† we have also a further confirmation of the fact in question, as given us by Mr. John Ball, of Troy, New York, at the close of his interesting account of the country west of the Rocky Mountains; he says, "A return from the Columbia river by water around Cape Horn, touching at the Sandwich and Society Islands, gave some opportunity to observe the winds, and other phenomena." "During three weeks stay at Tahiti, the tide was observed to rise about one foot, and always highest at twelve o'clock, noon and midnight, and I was informed that this is always the case."

* See Boston edition, vol. ii., p. 225. † Vol. xxviii. p. 8.

It must, therefore, I think, be admitted, that there is a suspension or neutralization of the lunar tide-wave in the region in which those islands are situated. We find, too, that in the Atlantic it is high water on the coast of Surinam about five o'clock on the days of the new and full of the moon, and the flood runs to the westward. At the windward islands of the West Indies, the tide is some one or two hours later, and, though exposed to the whole tide range of the Atlantic, the tides are very weak and irregular, not rising more than at the Society Islands. On the southern coast of the United States, and at the island of Bermuda, in the Atlantic, it is high water about seven o'clock, the flood tide in the offing at the latter place *running to the northeast*. On the southern coast of Rhode Island and Massachusetts, it is high water from seven to eight o'clock. On the southeastern coast of Nova Scotia and Newfoundland, it is high water from eight to nine o'clock, the flood tide off the latter coast also running northeastwardly. At the Azores, or Western Islands, in lat. 38° N., near the middle of the Atlantic, it it is high water about 12 o'clock, *and the flood runs to the eastward.*† Finally, it is high water on the western coasts of Ireland and Spain about two o'clock, all on the same days. These statements are approximated from the American Coast Pilot, and other authorities, care being taken to avoid the retarding effects of local obstructions as far as possible, by timeing from the most extraneous positions of coast, towards the open ocean. Viewing these phenomena in connexion with some other facts, had led me to suspect that the great tide wave performed an actual circuit in each of the great oceanic basins, on both sides of the equator, passing *westwardly* in the equatorial latitudes, and returning *eastwardly* in the higher latitudes, above 25° or 30° north and south, and analogous to the course which is pursued, as can be demonstrably shown, by the great *currents*, both of ocean and atmosphere. If such *be* the operation of the tides, certain regions in mid-ocean would form the foci, or neutral points, in these great elliptical circuits, and would be but slightly, if at all, affected by the ordinary tides. The elaborate investigation of cotidal lines in which Professor Whewell is engaged, will probably show whether this conjecture is well founded, or whether the course of the great tide wave be from the Southern Ocean, northwardly, through the entire length of the Atlantic, and in disregard of the direct lunar influence in this ocean, as would seem to be indicated in his late paper on that subject. The greatest difficulty attending the inquiry, is in procuring correct observations from those islands and external points of coast, which bear most decidedly upon the question; and whatever may be its results, I am happy to find that a course or method of investigation which has governed my own inquiries in meteorology, has been adopted on this kindred subject, by so able a hand.

The second statement objected to by the writer of the notes, that "in Peru, at the height of 18,000 feet, the wind has been found to be fresh from the south-west," was given on the authority of Samuel Curron, Esq., whose interesting narrative of his ascent to the Peak

† See Penny Cyclopedia; article, Azores.

of Misté may be found in the Boston Journal of Philosophy and the Arts, vol. i., see p. 364-5. The authorities for the Sandwich Islands and Peak of Teneriffe, which were included in my statement, are also at hand; and I may add that the Rev. John C. Brigham, the present Secretary of the American Bible Society, in crossing the Andes, from Buenos Ayres to Chili, at the height of 17,000 feet, found the wind blowing strong from the west, as he has himself informed me.*

There are other facts which seem to indicate the prevalence of a southwesterly wind over the higher regions of tropical America, such as the fall of ashes, in 1812, at Barbadoes and elsewhere, from the volcano of St. Vincent; and the late fall of volcanic ashes at Jamaica, and other places, in January of the present year, which appears to be traced to the tremendous outbreakings of volcanos on the continent, near the Bay of Honduras.

It is unfortunate that those who visit high mountains, so generally neglect to inform us of the direction of the wind in those regions. I have been led to suspect, however, that in some, at least, of the cases mentioned by me, those winds were occasioned by the diurnal influences of heat and cold upon the stratum of air *lying upon the inclined surface of the mountain.* This was first suggested by the statement of Mr. Brigham, who was informed by the natives that this wind blew only in the day-time, and it seems not unlikely that most elevated peaks are subject to a similar influence. We have, however, far better evidence afforded to us of the course of the higher strata, in the movements of the clouds at different altitudes, which should have been recorded more generally than has yet been done. The fact appears, however, to be well established, that the great trade wind of the tropical latitudes does not prevail at any great altitude, nor does it usually cross any elevated region of country, to say nothing of its being arrested or deflected by its own gravitation in mid-ocean, in the Indian seas, and on the bosom of the great Pacific. But to return to the only remaining position which is called in question by the author of the notes, and which is in the following words.

"'The regular semidiurnal variations of the barometer is at its maximum about 10, A. M., and at its minimum about 3, P. M.; at New York it is nearly the same; *but at Edinburgh, the effect is reversed, the minimum being at* 10, *and the maximum at* 3 *o'clock,*' &c. I was (says the writer of the notes) startled at this statement, and immediately began to look for authorities to confirm or refute it, when I happened on the following passage in the second report of the British Association for the Advancement of Science, p. 131."

This is followed by a condensed statement of the observations made near Edinburgh, by Professor Forbes, since 1827, which have been published at length in the Edinburgh transactions; from which it appears that near Edinburgh, in latitude 56°, the mean annual oscillation between 10, A. M. and 4, P. M., is .0106 inches; and

* See Missionary Herald for 1826, vol. xxii., p. 153-4, where the *direction* of the wind is not mentioned.

that the St. Bernard observations, 8000 feet above the level of the sea, and those of Capt. Parry, in the Arctic regions, both indicate a true negative oscillation, &c.

I readily acknowledge a partial inaccuracy in my statement, which should have read, "but in high latitudes the effect is reversed," &c., the locality or latitude of Edinburgh not being that in which the negative oscillation is established; and the error was subsequently so corrected. It may, however, be proper on this occasion to explain the cause of the inaccuracy. A short time before I was called upon to sketch the facts in meteorology, to which the foregoing exceptions had been made, the paper of Professor Forbes, above referred to, had met my eye, under circumstances, however, which precluded its perusal; and on glancing over its pages, and the illustrations which accompanied it, I perceived that the Professor had shown a negative oscillation of the barometer, taking effect somewhere in the higher latitudes, and his extensive series of observations having been made near Edinburgh, I was led to infer that this conclusion, or result, had been directly deduced from these observations. Under this impression, I ventured to pen the statement in its original form, which I should not have done, however, unless I had at that time felt myself certain of an opportunity to give the paper of Professor Forbes a thorough perusal, before my statement should pass through the press; but the concurrence of an unlooked-for accident, with a more speedy publication than I had anticipated, prevented my design from being realized.

I have now given the authorities and explanations to which the author of the notes seems entitled, and it may not be improper to state, for the satisfaction of those who may have read my articles on the storms of the American coast,* that the method pursued by me in investigating the physical character of those storms, has been to procure a number of copies of clean charts of the Atlantic, and to map out all the facts which I was able to collect in relation to any one of these storms, upon one of these charts, in their true time and location, so as to obtain a connected view of these facts, both as regards their consentaneous and consecutive relations. The results have been highly satisfactory—so much so, indeed, that I have not met with the statement of a single fact which is at variance with the explanation which I have given of the operation of these storms, *except in two or three instances, which proved, on further inquiry, to have been erroneously stated.* The historical records of more than a century past have been freely resorted to, and the inquiry has also been extended to other coasts and seas, and has shown the existence of an unvarying system, which I have not yet attempted to describe, except in the most summary manner.

It may well be supposed that, in pursuing this inquiry by the method of a simple induction of particulars, as here stated, I have not been able to preserve an unshaken confidence in some of those "received theories," which appear to have been founded on vague gene-

* American Journal of Science, vol. xx., p. 17-51; vol. xxi., p. 191-3; vol. xxv., p. 114-121.

ralizations, or unproven and untenable hypotheses; and I can hardly think that the reasonings which have at various times been adduced in support of these theories, from the time of Halley downwards, can be deemed either conclusive or satisfactory by any unbiassed mind, that shall give them a strict and impartial examination.

The grand error into which the whole school of meteorologists appear to have fallen, consists in ascribing to heat and rarefaction the origin and support of the great atmospheric currents which are found to prevail over a great portion of the globe. Nor is it necessary to perceive, or point out, an adequate and undeniable physical cause for the production of these phenomena, before we can discover the inconsistency and fallacy of the reasonings by which the old system of meteorology has been supported. Such a cause, however, I consider, is furnished in the rotative motion of the earth upon its axis, in which originates the centrifugal and other modifying influences of the gravitating power, which must always operate upon the great oceans of fluid and aerial matter which rest upon the earth's crust, producing, of necessity, those great currents to which we have alluded.

I have long entertained this conviction, but do not remember to have seen this great physical influence recognised in any degree, in its application to this subject, except by Sir John F. W. Herschell, in the third chapter of his popular treatise on astronomy,* where, by the aid of this rotative influence, he has been able to give us the most imposing support of the received theory of winds which has ever appeared, and in which the connection of the trades with the returning westerly winds, is, with some exceptions, correctly developed. Sir John, however, has erred, like his predecessors, in ascribing mainly, if not primarily, to heat and rarefaction, those results which should have been ascribed solely to *mechanical gravitation*, as connected with the rotative and orbitual motion of the earth's surface, the influence of which he partially recognizes in connection with this and another subject of inquiry. I may also add, that, had this able philosopher been fully conversant with the facts which relate to the *course* and other phenomena of hurricanes, he would probably have withheld the hypothesis which he has given in a note appended to the chapter which I have alluded to, although one of the principal suggestions in this note has, undoubtedly, a proper connection with the subject.

As I can but seldom allow myself to enter upon the discussion of these matters, the preceding suggestions may be taken for what they are thought to be worth by those under whose notice they may chance to fall; but, to prevent being misunderstood, I freely admit that heat is often an exciting, as well as modifying, cause of *local* winds, and other phenomena, and that it has an incidental or subordinate action (though not such as is usually assigned) in the organization and development of storms, and that, in certain circumstances, it influences the interpositions of the moving strata of the atmosphere. Its greatest direct influence is probably exhibited in

* Art. 179 to Art. 200.

what are called land and sea breezes, or in the diurnal modifications which are exhibited by regular and general winds. But, so far from being the great prime mover of the atmospheric currents, either in producing a supposed primary north and south current, or in any other manner, I entertain no doubt that, if it were possible to preserve the atmosphere at a uniform temperature over the whole surface of the globe, the general winds could not be less brisk, and would become more constant and uniform than ever.

New York, April 8th, 1835.

Experiments on the Efficacy of Perkins' Steam Boilers, or Circulators. By A. D. Bache, *Prof. of Nat. Philos. and Chem., University of Pennsylvania.*

TO THE COMMITTEE ON PUBLICATIONS.

Gentlemen,—The following experiments were made soon after the description of the new steam boiler or circulator of Perkins, reached this country; they were undertaken at the request, and for the satisfaction, of my friend, Mr. M. W. Baldwin, and I did not at the time make them public, because it was understood that this boiler would receive a full trial, on a proper scale, upon locomotives in England. From an article in a recent number of the London Mechanics' Magazine, I infer that the results of these experiments have not been stated, except in the newspaper paragraphs which we have seen here. As the results of my experiments were not particularly favourable to those circulators, it is probable that their publication may elicit further information in regard to the trials made in England; and at all events they will furnish, while uncontradicted by experiments on a larger scale, approximate indications of the performance of the boilers in question.

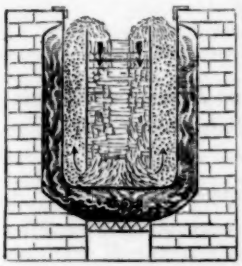
The following description of and remarks on the steam boiler of Mr. Perkins, is extracted from an anonymous pamphlet, entitled "Steam Navigation. Improvements by Jacob Perkins. Part I. The Boiler."*

"To a boiler is fitted a hollow lining, not extending throughout the boiler, but in proportion to circumstances, in order that a strong circulation in the water may be caused, and that, by driving a perpetual current forcibly against the inner surface of that portion of the boiler exposed to the fire, the whole of the heat may be taken up by the water. And here must be recorded the result of farther experiments. If two vessels be filled with water, one of them placed within the other, and heat be applied to the outer vessel in such a manner that none can reach the inner vessel, except through the water contained in the outer one, no steam bubbles can be made to arise in the inner vessel, whilst, in the outer one, steam bubbles are formed rapidly. The fluid in the outer vessel being composed of a mixture of bubbles and water, that in the inner vessel being water alone, the contents of

* See also Journal of the Franklin Institute, vol. xi., p. 47, January, 1833.

the two vessels, although of the same temperature, are of different specific gravities, the mixture of water and bubbles in the outer vessel is lighter than the unmixed water in the inner vessel."

"Now if, of the inner vessel, the bottom be taken out, leaving the vessel open at top and bottom, but so placed as to be kept full of water, having its upper edge nearly level with the water surface in the larger vessel, and its lower edge supported at a moderate distance above the bottom of the larger vessel, as shown in the annexed diagram,—the unequal specific gravity of the fluid, when exposed to the action of the fire, will cause it to move in a circulating current."



"The bubbles contained in the water of the outer vessel, adjoining the fire, will rise continually to the surface with a power, when at a low temperature, somewhat exceeding the difference in the specific gravity of air and water; but if the number of bubbles be increased by additional heat, the difference between the respective specific gravities will be increased also, inasmuch as a larger quantity of vapour will be present in the water between the inner and the outer vessel, and the rapidity and force of the upward action will augment in a proportionate ratio; and if the heat be greatly increased, augmenting the relative proportion of steam bubbles, still more rapid and powerful will be the force and rate of their current to the surface, (their bursting and giving off the vapour conveyed in them,) whilst the water, in contact with the bubbles, partaking of their influence, will rise in a current also, having a tendency to produce a vacuum in the lower portion of the boiler. At the same time, the fluid in the inner vessel being unmixed with bubbles of vapour, or steam, will, by its greater specific gravity, descend, and continually arrange itself under the rising columns of the outer vessel, and so produce a circulating current."

"Thus may water be converted into steam four times faster than by the common method; or, in other words, by an apparatus of this kind, of one-fourth the size and weight of an apparatus of the common kind, an equal quantity of steam of any required power can be made in a given time, saving

Three-fourths of the space occupied by the ordinary apparatus,

Three-fourths of its weight, and

Three-fourths of the inconvenience and danger arising from its bulky contents of heated water."

In the trials of this boiler, a cylinder was used, $2\frac{1}{2}$ inches in diameter, and terminated by a curved end; the whole length, along the axis of the cylinder, from the mouth to the bottom of the vessel, being $4\frac{3}{16}$ inches. Within this was placed, in the first experiments, a second vessel of the same general figure, $1\frac{1}{2}$ inch in diameter, and $2\frac{11}{16}$ inches in depth, and having an opening in the bottom to allow the circulation of the fluid.

The space between these vessels was one-half of an inch across,

perpendicularly to the surfaces. The inner vessel was suspended from the mouth of the outer one by wires, which kept it in its place. Both vessels were of copper, about $\frac{1}{32}$d of an inch thick.

The opening in the lower part of the inner vessel was made at first half an inch in diameter; it was subsequently enlarged, until it occupied the entire section of the inner cylinder; this inner vessel was then changed for a second having a less diameter.

Two methods of applying heat were adopted: the first was by using a large double wicked spirit lamp, of the kind invented by Doctor Mitchell; the second by a charcoal furnace.

When heat was applied to the small boiler without the inner vessel, or circulator, the boiling took place over the whole upper surface of the liquid; when the inner vessel was in its place, foam formed only in the annular space between the two vessels, while the water contained in the inner vessel was tranquil. When the upper surface of the water fell to the level of the top of the inner vessel, the foam which formed in the annular space rose up, and poured over into the inner vessel. The circulation described by Mr. Perkins did take place, but there is obviously a question whether it was more rapid than when the currents of water were allowed to take their natural course, without being restrained to certain paths; and if more rapid, still the efficacy of this artificial circulation, in producing steam, must depend upon whether the natural circulation is insufficient to carry off the heat as fast as it is imparted by the fire beneath the boiler.

In the first comparative experiment, the following plan was pursued.

A measured quantity of water was placed in the cylinder, the circulator being in its place; an alcohol lamp, before alluded to, having the wicks previously saturated with alcohol, and a measured quantity of alcohol then poured into it, was placed under the boiler, and lighted, the time being noted; the time at which the water began to boil was observed; water was allowed to drop slowly, from a vessel containing a measured quantity, into the middle of the cylinder, so as to supply, at least in part, the waste from the production of steam. When the experiment had continued thirty minutes, the lamp was extinguished, the boiler placed in a vessel of cold water, to cool the water in it rapidly, and its contents measured; the alcohol was poured from the lamp, and measured; and the water remaining in the supply vessel, measured. The temperatures at which all these measures were taken, were made as nearly uniform as was convenient; as minute accuracy was not desired, no reductions have been made for the temperatures, which were, however, observed, that they might be kept within proper limits.

From the ascertained deficit of water in the supply vessel, and in the boiler, the quantity converted into steam was known; from the time required to raise the water in the boiler to the boiling point, which was observed, an approximate value of the time required to raise the supply water to ebullition, was calculated; this time, subtracted from the observed time, during which the whole liquid was

boiling, gave the time required to convert into steam the quantity of water which had disappeared. The alcohol consumed was known from the quantity remaining in the lamp, after the experiment; and the amount of alcohol consumed in converting the water into steam, was known by comparing the whole duration of the experiment with the time, just found, required to convert the water into steam. The elements of comparison were then at hand, viz: the time required to convert a given quantity of water into steam, with a given expenditure of fuel.

The results of the first comparison were as follows.

Comparison of a Vertical Cylinder Boiler, with and without a Circulator.

	With inner cylinder, 1¼ in. diam. aperture ½ in.	Without inner cylinder.
Observed Quantities.		
Water in boiler at beginning of experiment,	9.75 meas'rs.	9.75 meas'rs.
" end,	6.00	5.06
Differences, or quantity consumed less the supply,	3.75	4.69
Water in supply vessel at beginning of experiment,	2.00	2.00
" end,	0.41	0.75
Difference or supply, to be added to the difference obtained above,	1.59	1.25
Water converted into steam, (1.59 + 3.75)	5.34	(1.25 + 4.69) 5.94 meas'rs.
Alcohol consumed in the experiment,	3.22	3.63
Time from beginning of experiment to ebullition,	490″	470″
Whole time of experiment,	1800″	1800″
Calculated Quantities.		
To raise the supply water to ebullition,	80	60″
Time required to boil away 5.34 measures of water, being (1800—490—80)	1230″	5.94 measures, (1800—470—60) 1270″
Would have boiled away in 1800″ or 30′,	7.81 meas'rs.	8.42 meas'rs.
Alcohol consumed in 1800″,	3.22	3.63 meas'rs.
Would have boiled away in 30′, with a consumption of 5 oz. of alcohol,	12.13 meas'rs.	11.61 meas'rs.
Ratio,	1.04	1.00

The calculations made in the foregoing table are simple proportions, and, therefore, probably, require no illustration. For the

purpose of comparison, the quantity of water which would have been vaporized in 30′, is deduced from the quantity vaporized in the time given by the experiments; and from the alcohol consumed in 30′, to vaporize the calculated quantity of water, the quantity which would have been converted into steam by five measures of alcohol, supposed to be consumed in 30′, is deduced.

The only quantity in the foregoing table which is not strictly deduced, is the time required to raise the water supplied, to the boiling point; this is calculated from the observed time required to raise the water in the boiler to the boiling point, whereas, the water being gradually introduced into the midst of boiling water, would probably require a different time. The allowance is in the proper direction, and inconsiderable in amount, and, therefore, does not sensibly diminish the accuracy of the approximation.

In the following experiments, charcoal was used as a fuel. A tin vessel about ten inches in diameter, and ten in height, was converted into a furnace by piercing it, about two inches from the bottom, with holes, through which thick wires were passed to support the fuel; an aperture for the draught was made below the bars. Two wire handles, in planes at right angles, were attached to the upper edge of this furnace, the handles being united by a wire hook, which served to attach the furnace to a scale beam.

A weight was first applied, sufficient to balance the furnace; fire was then made, and the furnace and contents being weighed, the weight of the latter was ascertained. In practice, it was found convenient to use always the same weight of fuel. Weighed parcels of charcoal were provided to add to the furnace during the experiment. The fire being in full combustion, and the regulated weight of fuel being in the furnace, the boiler, containing a measured quantity of water, was placed in the midst of the fuel; the other arrangements were as formerly stated,—the time which was required to raise the water to ebullition being observed, and also the time of duration of the experiment, which was usually about half an hour. The supply of water introduced, and the quantity vaporized, were ascertained, as before described. The experiment being terminated, the boiler was rapidly transferred into a vessel of cold water, and the furnace to the scale beam, the weighing being made as rapidly as possible, to ascertain the fuel consumed; account was, of course, taken of the quantity added during the experiments, and an attempt made to render this as nearly uniform as possible.

The balance which was used, turned readily with .05 of an ounce troy, and detected instantly the loss of weight by combustion, when the furnace, having burning fuel in it, was balanced upon the beam.

In the first experiments, the boiling carried a small portion of water over the sides, to remedy which, an extra cylinder, of an inch and a half in height, was added to the first described; notwithstanding this, the ebullition caused by the charcoal was so much more violent than that by the lamp, that, in the first experiment made, much water was carried over in foam; on this account, an additional

vessel, funnel shaped, and about three inches high, was placed upon the former, completely remedying the defect noticed. A tin disk was placed around the boiler, at the level of the original vessel, to prevent it from sinking further than this level in the furnace.

The heat lost in this furnace by radiation, contact, &c., while it would affect a theoretical question, makes this form of experiment represent more closely the case in practice.

In the following two comparative experiments, no water was supplied; the measures are fluid ounces, and the weights ounces troy.

Table of Comparative Experiments, with and without Circulator.

Observed Quantities.	With inner cylinder, as in the first experiment.	Without inner cylinder.
Water in the boiler at the beginning of the experiment,	11.00 fl. oz. at 53½° F.	10.00 fl. oz. at 53½°
" end,	1.12 "	0.87 "
Water vaporized,	9.88 "	9.13 "
Coal consumed,	5.72 oz.	5.25 "
Time required to vaporize the water,	1670 secs.	1467 secs.
Time elapsed during the entire experiment,	2170 "	2047 "
Calculated Quantities.		
Water which would have vaporized in 30′,	10.64 fl. oz.	11.19 fl. oz.
Fuel consumed in 30′,	4.75 oz.	4.62 oz.
Water which would have vaporized in 30′, by 5 oz. fuel,	11.20 fl. oz.	12.11 fl. oz.
Ratio,	0.93	1.00

In one part of this experiment, when the water was low, the foam raised by the ebullition occupied the inner cylinder, being in its place, twenty times the bulk of the water then in the boiler. The experiment did not represent, with entire fairness, the effect of the circulator, having been continued after the water was very low; this fact did not appear until, the experiment having been stopped, the foam was allowed to subside.

In the trials which follow, water was introduced slowly, as at first, a small float being used to endeavour to maintain a constant level.

The following table gives a comparison with the same inner cylinder, and without it. The quantities are arranged as in the first table.

Table of Comparison of Boiler, with and without Circulator.

Observed Quantities.	Inner cylind. 1½ in. diam., aperture ½ in.	Without inner cylinder.
Water in boiler at beginning of experiment,	11.00 fl. oz.	11.00 fl. oz.
" end "	9.75 "	14.87 "
Difference,	1.25 "	3.87 "
Water in supply vessel at beginning of experiment,	20.00 "	20.00 "
" end "	13.82 "	8.69 "
Difference,	6.18 "	11.31 "
Water vaporized, (6.18 + 1.25)	7.43 "	7.44 "
Charcoal consumed,	4.45 oz.	5.00 oz.
Time from beginning of experiment to ebullition,	520 secs.	500 secs.
Total duration of experiment,	1680 "	1800 "
Calculated Quantities.		
Time required to raise to ebullition the supply water,	292 secs.	513 secs.
Time required to vaporize the quantity of water above stated,	860 "	787 "
Quantity of water which would have been vaporized in 30′,	15.40 fl. oz.	17.02 fl. oz.
Fuel consumed in 30′,	4.77 oz.	5.00 oz.
Water which would have been vaporized in 30′, by 5 oz. charcoal,	16.15 fl. oz.	17.02 fl. oz.
Ratio,	0.95	1.00

The opening at the bottom of the inner vessel was next enlarged to $\frac{15}{16}$ths of an inch, and finally the bottom of the vessel was cut off, thus giving the full area of the cylinder for the opening of the circulator. The following table contains the comparisons.

Table of Comparison of two Circulators, of different openings.

Observed Quantities.	Inner cylinder 1½ in. Apert. 15-16ths inch.	Inner cylinder 1½ inch. Aperture 1½ inch.
Water in boiler at beginning of experiment,	11.00 fl. oz.	11.00 fl. oz.
" end, "	8.93 "	11.62 "
Difference,	2.07 "	0.62 "
Water in supply vessel at beginning,	20.00 "	20.00 "
" end,	12.72 "	12.06 "
Difference,	7.28 "	7.94 "
Water vaporized,	9.35 "	7 32 "
Charcoal consumed,	5.40 oz.	4.75 "
Time from beginning to ebullition,	603 secs.	508 secs.
Whole duration of experiment,	2100 "	1820 "
Calculated Quantities.		
Time to raise supply water to ebullition,	399 secs.	367 secs.
" vaporize water above stated,	1098 "	945 "
Water vaporized in 30′,	15.33 fl. oz.	13.94 fl. oz.
Fuel consumed in 30′,	4.63 oz.	4.70 oz.
Water vaporized in 30′, and with 5 oz. fuel,	16.56 fl. oz.	14.83 fl. oz.

The next trials were made with a smaller cylinder, used as a circulator, three-fourths of an inch in diameter, and without bottom. This failed to answer any good purpose, as might have been expected; it is unnecessary, therefore, to give the details.

A recapitulation of the results obtained in the foregoing experiments, is given in the annexed table.

Comparison of Experiments with a vertical Cylinder Boiler, without and with an interior Circulator.

Alcohol as fuel.		Charcoal used as fuel.					
		Without supply of water.		With nearly constant level of water.			
					With inner circulator		
					Diam. of apert. in bottom of inner cylin.		
With inner cylinder.	Without inner cylinder.	With inner cylinder.	Without inner cylinder.	Without inner cylinder.	½ of an inch.	15-16ths of in.	1½ inch.
		fl. oz.	fl. oz.	fl. oz.	fl. oz.	fl. oz.	fl. oz.
12.13 meas	11.61 meas	11.20	12.11	17.02	16.15	16.56	14.83
1.04 "	1.00 "	0.93	1.00	1.00	0.95	0.97	0.87

The inference from this table is obviously that, so far from producing any important effect in promoting the generation of steam, the inner cylinders, or circulators, did not even effect a sensible increase in the quantity of water vaporized in a given time, and with a given quantity of fuel. The diminution of five, and three per cent. observable in the last two columns of the above table, and the gain of four per cent. in the first column, are clearly within the limits of the approximations which the experiments furnish.

FRANKLIN INSTITUTE.

Quarterly Meeting.

The forty-fifth quarterly meeting of the Institute was held at their Hall, on Thursday evening, April 16, 1835.

Mr. John Horten was appointed Chairman; and

Mr. Edward H. Gill, Rec. Sec. P. T.

The minutes of the last quarterly meeting were read and approved.

Donations of books were received from the Society for the Encouragement of Arts, Manufactures and Commerce, of London; Professor Faraday, of London; Councils of the city of Philadelphia; the

Geological Society of Pennsylvania; Hon. James Harper; George Fox, Esq, Mr. Wm. W. Smith, Mr. M. W. Baldwin, and Messrs. Carey, Lea & Blanchard, of Philadelphia.

Donations to the cabinets of models and minerals, were received from—

Robert Pettit, Esq.; John C. Trautwine, Esq.; Messrs. Lehman & Duval; Mr. Jos. S. Walter, Jr.; Mr. Richard Oakford, and Mr. E. C. Biddle, of Philadelphia.

The actuary laid on the table, the various periodicals received during the last quarter, in exchange for the Journal of the Institute.

The chairman of the Board of Managers presented their quarterly report, which was read and accepted, and referred, for publication, to the Committee on Publications.

The Treasurer presented his report for the last quarter, which was read and accepted.

A communication from the American Lyceum, inviting the Institute to attend, by delegates, their fifth annual meeting, was presented and read; when, on motion, the Corresponding Secretary was instructed to acknowledge the receipt of the invitation.

Extract from the minutes.

JOHN HORTEN, *Chairman.*

EDWARD H. GILL, *Rec. Sec. P. T.*

Forty-fifth Quarterly Report of the Board of Managers of the Franklin Institute.

The Board of Managers respectfully submit to the Institute, the following report of their operations for the last quarter.

Immediately after their organization, the several standing committees were appointed, and they have since been actively and zealously engaged in the performance of the duties entrusted to them.

The Library is a subject of deep interest to the members of the Institute, and the Board are happy to announce that it is slowly, though steadily, increasing, and that, during the last quarter, a number of valuable additions have been made to it, of practical and scientific works.

The Lectures of the Institute were closed on the 25th of March last; the large number of the class, and their regular attendance during the season, clearly evince the interest taken by the members and the public in this method of popular instruction, which, the Board indulge the hope, will long continue. The disorderly conduct of minors, so much complained of in former years, was, in consequence of the efficient measures adopted by the committee on instruction, at the commencement of the lectures, entirely prevented. The Board of Managers cannot but express their acknowledgments to the several professors and lecturers, for the zeal and ability they have displayed in the service of the Institute. The unusually large number of pupils in attendance at the drawing and English schools, is an evidence that their importance, and the beneficial influence they

will exert upon the rising generation, are properly and duly appreciated.

During the last quarter, some additions have been made to the cabinet of models. The committee on minerals are actively engaged in the classification and arrangement of those in the possession of the Institute, which, it is believed, will soon be completed.

A large portion of the time of the Committee on Publications, has been industriously devoted to the improvement of the Journal, and its high reputation, not only throughout our own country, but also in Europe, should, in the opinion of the Board, induce the members of the Institute, and the public generally, more extensively to encourage and patronize it.

The list of premiums for the exhibition in October, 1835, reported by the committee on that subject, and adopted by the Board, will be found to embrace a greater variety of objects than that of any former exhibition of the Institute. It has been printed, and will, together with an address to the manufacturers and mechanics of the United States, be extensively distributed. To awaken and create a laudable spirit of emulation and improvement, has always been the principal object of the exhibition of articles of domestic manufacture, and the Board rely with great confidence upon the support and co-operation of the mechanics and manufacturers of Pennsylvania, and of the United States, to render the exhibition of this year as interesting, attractive, and useful, as those of preceding years.

The Committee on Science and the Arts have continued their active and useful labours. The number of members has increased, and the interest in their meetings and reports is fully sustained. During the past quarter, this committee have recommended to the managers the award of two premiums and medals from the Scott's legacy fund,—one to Philos Tyler, of Philadelphia, for the invention of a shifting gauge cock for steam boilers; the other to Thomas Ewbank, of New York, for an improved method of tinning lead pipes. These awards have been confirmed, subject to the rules of the committee.

The committee, at their annual meeting, re-elected Prof. A. D. Bache their chairman for the ensuing year.

The monthly meetings have been regularly held, and numerously attended. The reading room continues also to be much frequented, but the necessity of a livelier and deeper interest in this is much felt, in order to make it of extensive utility and benefit.

During the past quarter, Mr. H. R. Campbell has been admitted a life member.

All which is respectfully submitted.

GEORGE FOX, *Chairman.*

WILLIAM HAMILTON, *Actuary.*

Monthly Conversation Meeting.

The sixth conversation meeting of the Institute, for the season, was held at their Hall, March 26th, 1835.

Messrs. B. Slater & Co. exhibited two hatchets, made by Joel Howe, of Princeton, Mass. which were much admired for their finish.

Messrs. Carr & Lunt exhibited the following highly approved articles,—A specimen case of castors, made by H. Huntington, Jr., of Hartford, Conn.; a gimlet, by J. H. Mather, of Deep run, Conn.; and a catch for window sashes, by N. & A. M. Goodyear, of New Haven, Conn.

There was laid upon the table, from Richard Oakford, Esq., a specimen of Payta cotton, accompanied by a letter, stating the particulars of the growth of the tree which yields this article, and the peculiarities of the cotton itself. The specimen closely resembled fine wool.

Professor Johnson exhibited some alcohol and mercurial thermometers, constructed by him, of large size, and admitting of graduation to hundredths and even two hundredths of a degree, Fahrenheit. He showed a curious fact, not noticed in descriptions of the thermometer, namely, that the first effect of heat on one of these instruments, is to cause a fall in the liquid, and the reverse on reducing the temperature; effects produced, as was explained, by the expansion and contraction of the glass. Professor Johnson also showed a thermometer with an oblong bulb, containing within it a second bulb, hermetically sealed, leaving but a small space between the two, and thus exposing considerable surface, compared with the mass of the liquid.

A model of a rotary steam engine, by Dr. Ethan Baldwin, of Washington city, was submitted for inspection.

A model of a canal boat, with a peculiar propelling apparatus, invented by W. Bush, of White Marsh, was placed in the room. This model has been submitted to, and reported upon by, the Committee on Science and the Arts.

Prof. A. D. Bache explained certain methods devised by him for illustrating the radiation and absorption of heat by different surfaces, the conducting power of solids, &c. The articles of apparatus exhibited are described in the last number of this Journal.

AMERICAN PATENTS.

LIST OF AMERICAN PATENTS WHICH ISSUED IN NOVEMBER, 1834,

With Remarks and Exemplifications, by the Editor.

1. For a *Machine for Thrashing Grain, and Picking Hair and Wool* for upholsterers; Joshua Bean, Readfield, Kennebeck county, Maine, November 5.

There are, in this machine, four beaters, which are segments of a cylinder of a foot in diameter; they are fixed upon arms, and are made of wood, each of them being three inches wide, and covered with sheet iron, punched so as to form a grater. The spaces between the beaters are open. A concave, placed at the distance of about half an inch from the circle formed by the revolving beaters,

is also covered with punched sheet iron, this concave being made adjustable.

The patentee claims as his "invention, the open beater, or fly wheel, the general form and operation of the machine, and the application of the principles developed in this specification, to the purposes for which the machine is described."

This claim sounds very well, but as open beaters are very common things in thrashing machines, and as the principle developed in the specification has not been rendered visible to us, we cannot find any thing in the whole that appears original. At p. 110, we have given the specification of a very similar machine, for picking curled hair, in which teeth are placed in rows upon a cylinder, leaving void spaces between the rows. In our opinion, these machines are *substantially* the same, and how much they differ from some of the thrashing machines described on our pages, we leave the reader to judge; that above alluded to was not claimed as applicable to thrashing, and the iron graters on the one before us we do not think well adapted to this purpose.

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2. For *Stoves for Burning Anthracite;* Denison Olmsted, New Haven, Connecticut, November 5.

(See specification.)

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3. For an improvement in *Axles and Boxes for Rail-road Cars;* Dexter C. Force, and Frederick Davis, city of Baltimore, November 6.

The axle is to be turned and made true in the usual way, and upon it is to be placed a metal ferule, or tube, fitting it exactly. The wear from running is to be between the ferule and the box contained in the hub of the wheel, so that no wear whatever shall take place on the axle itself.

The material of which the ferule, or tube, is to be made, is not particularized, but it is said that it may be "either of composition, or of iron made case hardened." There is no claim, but it is sufficiently plain that the patent is taken for the using of the ferule, or tube, between the axle and the box.

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4. For *Thorough Braces for Carriages and Rail-road Cars;* Frederick Davis, city of Baltimore, Maryland, November 6.

These thorough braces are to be made either of wood or of iron, although the latter appears to be preferred; it is to be of the kind called band iron. The brace is to extend along under the lower side timbers of the carriage, like those of leather, and is to have one or two hinge joints near its middle, where the body is to be attached to it. To strain, or take up the brace, there may be shackles at the ends, where it is attached to the jacks, furnished with a tightning screw and nut. Sometimes the brace is made double at each end, a

piece, forming a strap, being attached to each jack; these pieces, and the ends of the braces, have rows of holes, through which bolts may pass, and by sliding these upon each other, the bolts may be passed through different holes, and the length of the brace be thereby regulated.

"The improvements to which I lay claim as original, are the forming the entire brace of iron, other metal, or wood, in the peculiar manner I have described, so jointed and attached to the body, as that it may be free to act on it without obstruction, when jolted or put in motion by the roughness of the road; and also the application of it to all descriptions of carriages or rail-road cars, where thorough braces are required; also the application of the screw and the fixtures described, to carriages where body loops are used, so as to raise and lower a body at pleasure, and to give a pleasant motion to the vehicle, without the use of the leather braces heretofore employed."

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5. For *Bee Hives;* Abial Whitman, Londonderry, Windham county, Vermont, November 6.

The object aimed at in this hive, is so to construct it that millers may not deposit their eggs at its entrance, and thus to prevent the destruction of the bees and honey by those insects. The hive is to be made of five pieces of board, two of which, forming the ends, are triangular. Two pieces of board, sixteen inches wide, one of them three feet, and the other two feet six inches long, are nailed on to two sides of the triangular ends, but so as to leave an open space of about three-eighths of an inch at the angle, through which the bees are to enter. This angle is to be placed downwards, the sides resting against parallel bars. A piece of board nailed on the top forms the roof, which, in consequence of the unequal length of the two sides of the triangle, has the requisite slope. There being "no platform, as heretofore used, to support the hive, upon which, in the filth collected at the bottom of the hive, the millers deposit their eggs."

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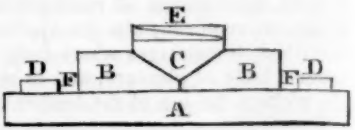
6. For *Blocks for Docking and Building Vessels;* John Williston, Portsmouth, Norfolk county, Virginia, November 6.

The description of these blocks is brief, the whole substance of it being as follows: 1st. A ground block of convenient size for the intended purpose, lying horizontally, and at right angles to the direction of the keel. 2d. A rider block surmounting the ground block, and divided into equal parts by a vertical cuniform section, the faces inclined to each other at an angle of about one hundred and twenty degrees; strong cleats are to be firmly secured to the upper surface of the ground block, to prevent the separation of the rider block at the cuniform section; a space is to be left at each end, sufficiently large for the reception of married wedges. 3d. Two alternate, or married, wedges, equal in length and breadth to the cuniform section, and resting thereon.

These blocks, if used in a dock, are to be well secured to the

floor, to prevent their rising on the admission of water. The vessel is to be carefully placed upon the centre of the alternate wedges, if used, as the water is withdrawn, or otherwise on the centre of the cuniform section. When a block is to be removed, the married wedges between the cleats and the ends of the rider are to be withdrawn, and the cuniform section will then fall sufficiently low. The alternate wedges resting on the cuniform section, are to be used when deemed expedient, to give greater support to any particular part of a vessel than could be imparted by the wedges at the ends of the rider.

We give a sketch of the arrangement, to enable those concerned to judge of its novelty and utility, the patentee not having designated, as he should have done, the points upon which his claim to invention is dependent. A is the ground block; B, the riders; C, the cuniform section; D, cleats; E, wedges; F, spaces for wedges at the ends.



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7. For *Wrought Iron Door Handles;* Harlow Isbell, Meriden, New Haven county, Connecticut, November 8.

The improvement claimed is in the form of the handles of what are called Norfolk latches. These handles, it is said, ought to swell in the middle part, but to obtain such swell on wrought iron requires considerable labour; to obviate this disadvantage, the handle, made of rod iron, is to be placed in a proper mould, and metal of any suitable composition to be cast around it, which may be done in the form of mouldings, or otherwise.

The claim is to "the addition of one or more enlarged parts to a common wrought iron door handle, by means of a metallic substance cast around the same."

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8. For an improvement in *Door Handles*, usually called Norfolk latches; Harlow Isbell, Meriden, New Haven county, Connecticut, November 8.

In this handle, the part which is to be grasped in the hand is to be of cast-iron, and, with the exception of the swell caused by the pattern, or moulding, it is to be straight from end to end. Two short pieces, or studs, of wrought iron connect the handle with the plate; these are embraced at one end in the cast-iron, and by the other may be riveted to the plate. The iron forming the handle referred to in the preceding patent, is bowed, or curved; in this, the handle part is parallel with the plate, its ends being at right angles thereto.

The claim is to the forming the part particularly called the handle, by the combination of cast and of wrought iron, in the way described, whether the two are united by casting, or by riveting, screwing, or otherwise.

9. For a *Machine for Hulling Clover Seed;* William C. Grimes, York, York county, Pennsylvania, November 8.
(See specification.)

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10. For a *Machine for Hulling Clover Seed;* William C. Grimes, York, York county, Pennsylvania, November 8.
(See specification.)

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11. For an improvement in *Screw Augers;* Raymond French, Derby, New Haven county, Connecticut, November 11.

This is said to be an improvement on screw, pump, and spur augers, and consists in giving to the plates which are to be twisted, a longitudinal, concave surface, so that the plate, as well as the pod, when twisted, shall be thinner at the centre than at the edges, either by a regular curvature, by a diminution of thickness formed by straight lines, or by lines in part curved, and in part straight.

"All that I claim as my invention in the foregoing improvement, is, the principle and its application to use, of constructing the plate and pod of screw augers and bitts, thicker upon the edges than in the middle, under the modifications, and in the manner above specified, and that the same principle and form may be applied to all tools used for boring holes in wood or timber, having a twisted pod, and two spiral semi-cylinders."

The advantage derived from this construction is said to be, that it gives to the spiral cavities of the pod, when twisted, a greater capacity towards the inner surface, and more perfectly envelopes the core, or chips, within a metallic surface, in their passage from the bottom to the top of the hole while boring, by which they are caused to rise and flow off more freely and rapidly. A coarser screw than usual may, it is also observed, be given to an instrument of this construction, and its strength and durability are increased from the manner of distributing the metal.

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12. For a *Thrashing Machine;* Stacy West, Hartford county, Maryland, November 11.
(See specification.)

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13. For an improvement in the *Hydrant;* Jacob Stroop, Allegheny, Allegheny county, Pennsylvania, November 11.

The main object to be accomplished by the machinery here patented, is not expressed either in the petition or the specification; this object is, however, to withdraw the water from the discharge pipe in hydrants, so as to prevent its freezing.

In vol. xiii., p. 405, we have given the specification of a patent for a similar machine, obtained by Messrs. Laning and Newton, on the 30th of July, 1833; and at p. 392 we have noticed one granted to Mr. Stroop, on the 16th of December of that year, for a contrivance exactly resembling it in principle. In the patent before us, he has

given another modification of the same thing, without, however, alluding to his former patent, or pointing out the improvements claimed in the present; in fact, there is not any claim appended to it. For the general principle of action, we refer to Laning & Newton's specification. So far as dates are concerned, the presumption is that they were the first inventors, and the variations introduced by Mr. Stroop do not, certainly, constitute his a new machine.

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14. For *Combined Levers;* Caleb Tompkins, Montgomery, Montgomery county, Alabama, November 14.

We do not know that our title will be approved by the patentee, but the length of it, as given by him, forbade its finding a place in the heading; not to delay justice, however, we now give it in extenso:—"*A new and useful application of principles, consisting of cross bars, cross levers and ends, and cross and single levers; bars; shafts; pieces; tumbling bars; balances; action horizontal; perpendicular, rotary, reciprocating, surface and central action of lever powers; simpleness and economy in its useful principles, which has not heretofore been used or known.*" The preceding is from the title in the petition, which, it appears, was not sufficiently comprehensive, as we have a further enumeration in the specification, as follows:—"*Principles of action, and power on levers, cross bars, cross bars combined, levers, cross levers, cross bars, and ends, and cross ends, crank, shaft, bars, pieces, tumbling bars, centre and surface of balances, connecting pieces, bolts, screws, nuts, axles, axle centre box, sliding bolt, bar slide, wheel bar, ways for action, centre and surface, horizontal, perpendicular, rotary, circular, reciprocating, alternate, to and fro, backward and forward, up and down, inward and outward, acting and agreeing in their respective actions.*"

To write a good book, nothing more is requisite than to know how to arrange the letters of the alphabet into suitable syllables, words and sentences; and in like manner, if a man cannot make a good machine when he has all the elements, objects, and means of motion, placed before him, it must be because he does not know how to combine them together.

It will scarcely be credited, after the long array of motive parts which the patentee has laid before us, that, when combined together according to the pattern existing in his imagination, and whilst we are looking for something almost "instinct with life," he should present us with nothing more than the antiquated contrivance of "lazy tongs;" yet such is the fact. There may be some of our readers who are unacquainted with the instrument so called, and for the sake of such persons, we will state that they consist of a number of cross bars jointed together at their middles, and at their ends, appearing thus ><>< ; and having at one end bows, like scissors, and at the other, tongs, to take hold of a coal, with which to enable the smoker to light his pipe, without the necessity of rising from his seat. They now, however, are to be applied to a more noble purpose, and to beget power enough, were the crosses sufficiently numerous, to push the moon from her orbit, by the action of a thumb and finger.

We do not recollect how long it is since some learned mechanician conceived the same idea with the present patentee, and actually obtained a patent for its application; the book is upon our shelves which would tell all about it, but being under the influence of an idle fit, and not having a pair of lazy tongs with which to reach it, we shall not quote the chapter and verse.

This combination of cross bars, the patentee calls his "PRIMUM-MOSHUN," through the aid of which all the great ends that he contemplates are to be attained. We will give his concluding remarks, leaving it to those who wish for more than the beginning and the end of his specification, to apply at the Patent Office, where the whole is upon record.

"In all cases where and when deemed necessary to return some power and action of power, producing in the application of *primum-moshun* (or cross bars) to be conveyed and applied to the first moving cause or action, by an increase, or crowded action of power; say one lb. produces by machinery one hundred lbs. weight, or force; thereby increase and return of action of the part of the hundred lb. force to the one lb. (or a sufficient part) to produce an increase of crowded action, by ballance, lever, wheel, bar, or any piece of machinery constructed to produce the effect which is effected, either or combined according to their use and intentions of this power application."

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15. For a *Rotary Engine;* Caleb Tompkins, Montgomery, Montgomery county, Alabama, November 14.

This machine is not a rotary steam engine, but a rotary *primum-moshun* engine, intended, of course, to carry the principles developed, or rather enveloped, in the preceding patent, into effect; the extraordinary nature of which has induced us to allow to it extraordinary space, but with the present we must be more brief; we, however, will give a quotation or two, for, although we do not understand the language in which the patentee writes, others may.

"This improvement represents the central action of axle of ballances by cranks on cross bars action or surface of ballances, or crank, producing leverage action and power, thus continued in proportion and number to increase any quantity of action and power designed to be obtained."

"This machine is intended to be applied to all kinds and description of use, and application of power, in agriculture, commerce, and manufactures, for mills, presses, hydraulics, locomotion, grinding, screwing, pounding, sawing, turning, raising water, ploughing, to draw and propel all kinds and descriptions of bodies or properties, propelling vessels that can be made to navigate the waters of the earth, or the fluids of the heavens."

Having conducted our inventor to a good place, there we leave him.

16. For a *Thrashing Machine, and Straw Cutter;* John Stewart, Cambridge, Dorchester county, Maryland, November 17.

This appears to be an unusual combination, but on examining the specification we find that, although it is claimed as such, it is not a combination in any sense of the word, but two distinct machines, neither of which is claimed, or rather each of which is disclaimed, by the patentee, as not being of his invention. A horizontal band wheel is to be turned by a horse, in the usual way, and this is to give motion to other band wheels and whirls, to drive a thrashing machine, attached to a suitable frame. When the thrashing machine is not wanted, it is to be removed from the frame, and that for cutting straw attached in its place.

The patentee says, "I do not claim to be the inventor of the thrashing machine, or the straw cutter, as both are public property; but what I do claim to be the inventor of, and for which I ask letters patent, is the combination of the two in one machine, and the general arrangement of the several parts, as above described." This seems to be something like a disjunctive conjunction.

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17. For a *Thrashing Machine;* John Shaw, Augusta, Kennebeck county, Maine, November 17.

There are to be four beaters, set with teeth, and revolving like a horizontal reel. The teeth are to be of wrought iron, about half an inch square, and to project out from the wooden beaters, about three inches; similar teeth are to be driven into a concave, and the whole is to operate in the ordinary way; the principle of action is precisely the same with that of many other thrashing machines, the points of difference being mere matters of arrangement. The claim is to "the revolving beaters; the shape and structure of the iron teeth; the manner of applying the hand power, and the cheap and compact manner of constructing the feeding board, and whole machine."

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18. For improvements on the *Water Wheel*, patented July 12th, 1834; William Kelly, Pittsburgh, Alleghany county, Pennsylvania, November 17.

We noticed the former patent at p. 99. Judging from the proposed improvement, we suppose that the patentee, upon attempting to carry his former plan into effect, found that his paddles would not assume the desired position; he has, therefore, complicated them, by the addition of a cross upon the axes, by which his compound paddles are suspended; and this cross is to come into contact with an iron arch, at the upper part of the wheel house, the action of which is to place them in the intended position. We are fully convinced that, in their improved state, these paddles will not operate better than the ordinary wheel, whilst they will be much more liable to be out of order.

19. For a *Thrashing and Winnowing Machine;* William Laighton, Portsmouth, Rockingham county, New Hampshire, November 17.

This differs from the great mass of thrashing machines in several particulars. Instead of a cylinder, there is to be a revolving, conical body, the axis of which is horizontal. This conical body may be three feet long, eighteen inches in diameter at one end, and ten at the other. It is to be channelled from end to end, so as to form upon it twelve, or any other convenient number of, angular teeth. A semicircular concave, adapted to it, and similarly grooved, occupies one-half its circumference, extending round from the top to the bottom. The driving apparatus is at the large end; the sheaves to be thrashed are passed between the cone and the concave longitudinally; that is, the straw end is to be held in the hand, in the direction of the axis of the cone, and the ears are to be passed through, by its revolution, the straw being still grasped; the grain, it is said, will be then removed entirely, and the straw remain unentangled, and unbroken. The winnowing part has nothing in it which requires description; the things claimed are the following.

"The conical ribbed cylinder, and the semicircular ribbed cradle, which, from their horizontal position, renders the labour of holding the straw less, and preserves it from being broken, and otherwise injured; the capacity of the cylinder and cradle to have any additional ribs necessary for shelling corn, and other coarser grain; and the method of letting the straw pass into the ribs lengthwise, by which the action of the ribs is upon the head or seed end of the sheaf, thereby splitting the hulls of the grain from end to end, instead of breaking them off."

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20. For a *Machine for Splitting Palm Leaf;* Charles Wadsworth, Barre, Worcester county, Massachusetts, November 17.

This machine consists of a cylinder of circular cutters, or knives, placed at a proper distance from each other, and which run against a second cylinder made of metal, not sufficiently hard to injure the edges of the knives. The two cylinders may be fixed in a frame like that of a flatting mill, with screws to adjust them perfectly to each other, and with cog wheels on the axes of the cylinders to cause them to revolve simultaneously.

There is not any claim made, nor do we think the machine new, although it is probable that it has never been applied to the splitting of palm leaf. Will not a machine of this description destroy the texture of the strips, by cutting them across the grain?

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21. For a *Printing Press;* Adam Ramage, city of Philadelphia, November 19.

This is a press intended for small work, and a main object in its construction has been to render it simple, and consequently cheap, whilst it should be efficient for the purposes to which it is to be applied.

A bed, or platform, may be made of wood, to which are bolted the two ends of a wrought-iron frame, that rises from it something in the form of a gothic arch. The carriage to support the form, frisket, &c., runs upon ways, and has a handle attached to it, by which it can readily be passed back and forth, under the platten. A vertical bar rises from the centre of the platten, through the top of the arch, its lower end being governed by a guide bar extending from one side of the arch to the other. The platten is raised by a spiral spring, surrounding the vertical bar, and is forced down by a lever, working like a pump handle, at the top of the arch, and connected with the bar by a toggle joint.

The claim is to "the general construction of the before described press; but particularly the wrought iron frame, which has the strength of a wrought iron bar drawn lengthwise; this principle is claimed however applied in the printing press, and of whatever shape the head and cheeks may be made, for seal or other presses."

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22. For *Water Proof Umbrellas;* Edwin L. Simpson, Roxbury, Norfolk county, Massachusetts, November 19.

Silk, or other material, is to be coated with India rubber in the usual manner; the segments to form the covering are not to be sewn together, but cemented by means of dissolved caoutchouc. The ends of the junctures are to be attached to the ribs of the frame by sewing, but at other parts small pieces of India rubber cloth are to be cemented, across the ribs, to the cover.

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23. For a *Portable Cooking Stove;* Thomas Whitson, and Gustavus E. Haynes, Roxbury, Norfolk county, Massachusetts, November.

This stove is, in preference, to be made of tin plate; it may vary in shape, but that represented in the drawing is oval. The oven occupies the middle part of the body of the stove, and has a door opening at the side in the usual way. There is a space between the bottom of the oven, and the bottom of the stove, and a similar space at top, these two being connected together by flues which pass up at either end of the stove. Dampers cover the tops of each of these flues, to regulate the draft. The fireplace, or furnace, with its ash pit, consists of a rectangular cast iron box, which slides in under the middle of the stove, at which part the bottom plate is removed; the furnace has the ordinary appendages. A pipe rises from the centre of the top plate, to carry off the smoke, and this plate is to be perforated for boilers.

The patentees say, "Although we have described the different parts of the said stove, yet we do not claim the different parts thereof separately as new; but what we claim as new, and of our invention and discovery, is the construction and arrangement of the whole of said stove, and its different parts in the connexion and combination, and for the purposes aforesaid."

There is about as much novelty in this, as in the larger number of the cooking stoves for which patents are obtained.

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24. For an improvement in the *Washing Machine;* Alanson D. Lord, Bethany, Genesee county, New York, November 24.

This washing machine is said to be an improvement upon that obtained by G. A. Stocking, Sept. 10th, 1829, and which was noticed in vol. iv., page 403, as being very imperfectly described, and presenting no claim. We described it as consisting of "a wooden cylinder, the periphery of which is formed of rollers, turned by a crank, and having below the cylinder, a spring board furnished with rollers; when by turning the crank backwards and forwards, the clothes are made to traverse between the cylinder and spring board." The improved machine now patented bears the same general character; it is better described and represented than that upon which it purports to be an improvement, but still we are not informed in what the improvement consists, nor is there any thing in the form of a claim.

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25. For a *Machine for Twisting Roving for Speeders;* Richard Fowler, and Richard Germond, Union Vale, Dutchess county, New York, November 24.

We cannot describe this machine at all, without allotting too much space to it, nor very well without drawings; some general idea, however, may be formed of its intention, though not of its construction, from the following quotation.

"The advantages of this machine will be obvious to all who have used the roving from the various condensing speeders, condensing by counter twist, or by rubbing; and the many attempts which have been made to impart the necessary strength to these rovings, show the importance of the results now obtained; and by using this simple improvement, the roving, in all respects better than that from the geared speeder, or fly frame, is obtained, and the great expense of those frames saved to the manufacturers. As many parts of this machine have been long known, such as the traverse and winding motions, and others—we, therefore, to the invention of these parts, separately, lay no claim whatever; but what we do specifically claim as our invention, is, all the parts and arrangement of the spindle above the bearing, consisting of the can, or cup, as arranged and fitted for turning the bobbin; and the principle and method of throwing off the roving from the bobbin by the action of the centrifugal power of its motion, and sustaining it against the inside of the can until drawn away by the receiving bobbin, and imparting to it, during this process, any quantity of twist, as before described. And we also claim the other parts of this machine as combined with the new parts invented by us, and the general arrangement of these parts as before described, by which we have produced a new and useful process or series of machinery, never before known or used."

26. For a *Weighing Instrument*, called the "Eagle Balance;" Levins Jencks, and Henry Dexter, Killingly, Windham county, Connecticut, November 24.

As this is called an eagle balance, we suppose that it is intended for weighing golden eagles, although, so far as accuracy is concerned, it would seem to be better adapted to the weighing of bald eagles, in which a grain more or less would not be a thing of very serious consequence. We have, in fact, never witnessed an equally ridiculous attempt at *improving* the common scales, than that now presented to us. Instead of a beam, there is to be a wheel, or pulley, which is to be suspended by a pivot, or pin, at its upper edge, by which it is to hang loosely; a strap, or chain, is to pass over the periphery of this wheel, and to one end of this strap the dish is to be suspended, and a counter weight hangs by the other. An index attached to the wheel reaches up to a graduated arch, its tilting causing the index to move. When more ponderous articles are to be weighed, a jointed index is employed, which has no fewer than four screws serving as fulcra, upon which turn the combined levers connected with it. The description, or specification, is in good keeping with the invention, being as imperfect and incongruous as it could well be made, and at the same time committing manslaughter upon orthography and mechanics.

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27. For an improved *Scythe:* Horace Naramore, Caledonia, Livingston county, New York, November 24.

The improvement claimed is in the form of the scythe. "The length is to be four feet, the width in the widest part four inches; differing from the scythe already known, and in common use, in the following particulars. It is to be more circular in its form, the major part of the circle being at the head end of the scythe, instead of the point, reversing the usual method. Those made for cutting grain, when connected with the grain cradle, have the head reversed from the common method, which is a considerable convenience in fastening the scythe to the sneath of the cradle. The same form of scythe is recommended for cutting grass, with the following exceptions; the scythe should be made narrower and shorter; reference may be had to the common grass scythe as to these particulars. The heel also turns the same way as in the scythe already known. I would suggest that the scythe may be advantageously connected to the sneath by means of screws.

"What I claim as my invention, is the peculiar form of the scythe as above described, together with the method of connecting them to the sneath by means of screws. I do not confine my improvement to any particular size in length and breadth."

We have thus allowed the patentee to give his own testimony in his own way; a principal reason for our so doing, has been the seeming intangibility and indefiniteness of the thing patented, at least to us, possibly because we have never been a cutter of grain and grass; we refer the whole, therefore, to the judgment of the husbandman.

28. For an improvement in *Axles and Boxes of Carriages and Rail-road Cars;* Dexter C. Force, and Frederick Davis, city of Baltimore. First patented on the 6th instant; patent surrendered, and reissued on an amended specification, November 24.

A notice of this patent, as first issued, will be found on turning to p. 390; and it will be observed that no claim was made by the patentees; an omission which is now supplied. We extract the following from the present specification. "The box in the wheel we make of iron, or other metal, extending through the nave of the wheel, with one or more chambers in it, sufficient to contain the oil; and on the outer end, next to the axle nut, we leave a flanch of about three-eighths of an inch, or proportional to the size of the wheel, which is made to fit into a rebate formed in the axle next to the nut, by being turned down a little shorter than the nave, so as to permit the flanch of the box to fit in, and prevent the oil from escaping, and dirt from working into the box."

"What we claim as our invention, and not hitherto known or used in the above described axle and box, is the *thimble*, or *ferule*, and its application to axles of carriages, rail-road cars, and all kinds of mill gearing and machinery where the same can be used. And in the box we claim the *flanch*."

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29. For a *Cooking Stove;* Levi Burnell, Elyria, Lorain county, Ohio, November 25.

The thing claimed in this stove, is "the horizontal rotary motion of the fire chest, in such a manner as to be able to apply, at pleasure, the greatest heat of the fire directly to either one of the boilers, griddles, or openings, in the superior top plate, while the said top remains stationary." We need not describe this stove, as that which was patented by Mr. E. D. Payne, on the 8th of March, 1834, of which the specification is given at p. 266 of the last volume, so completely *anticipates* it, as to render the task unnecessary; we refer to that modification of Mr. Payne's stove, in which he gives to it a circular form.

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30. For a *Portable Horse Power;* Smith Gardner, Rochester, Munroe county, New York, November 25.

The driving wheel of this machine, which is fixed on a vertical shaft, is to be about three feet in diameter, and has cogs on the inside of its rim, the rim extending below the arms, for the purpose of containing them. These cogs take into a pinion on a vertical spur wheel shaft, which, by a train consisting of another pinion and spur wheel, with bevil gear, turns a horizontal shaft. The horse is to turn the first named wheel by means of a sweep, in the ordinary way.

The claim is to "the driving wheel as above described, that is,—having teeth, or cogs, on the inside of the circumference, instead of on the outside; also the combination and arrangement of the other

parts of the machine as above described, for producing a portable horse power."

Wheels with teeth on the inner side of the rim are well known, and are in many cases advantageously applied; not so, however, in the present instance, where it seems to have been adopted merely that it might be claimed. At p. 410 of the last volume, a horse power is described in which such a wheel is applied with much skill, and, we believe, with decided advantage, although we have not yet learnt the result of a trial in the large way. The claim in the present machine, to "the combination and arrangement of the other parts," is one which cannot stand, as there is not one single feature of novelty in it.

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31. For *Moulds for Bending Scythe Sneaths;* Silas Lamson, Sterling, Worcester county, Massachusetts, November 25.

It is stated in the specification that the moulds usually employed are made of wood, which, from the heat to which the sneaths ought to be subjected in seasoning them, is apt to crack, or warp; the present patentee, therefore, substitutes moulds, either of wrought or of cast iron, and claims as his "improvement, the using of metallic, instead of wooden, moulds for shaping or moulding sneaths for scythes."

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32. For an improved mode of *Fastening Scythes to Sneaths;* Silas Lamson, Sterling, Worcester county, Massachusetts, November 25.

A ferule is to be driven on to the end of the sneath, and fixed in its place by means of a key driven through a mortise in the ferule, and sneath; different modes of forming these ferules are pointed out in the specification, but in all cases the ferules, or "rings, are made fast to the sneath, and by the help of nuts, [and screws,] the scythe may be fastened with less trouble, and more permanently, than by the manner which has been common heretofore." Perhaps Mr. Naramore, (No. 27,) who has *suggested* that scythes may be fastened to sneaths by means of screws, may think his plan interfered with; screws, however, are common property, and the manner of using them in the two cases is essentially different.

[SUPPLEMENT.]

Notice of two Patents issued in July, 1832, *which were accidentally omitted in their proper place, as were ten also in August,* 1833.

For a *Rotary Steam Engine;* Luther Carman, Oxford, Oxford county, Maine, July 16th, 1832.

The claim made in the specification of this patent is in the following words. "I claim as my invention, the peculiar manner of making the valves aforesaid, and the particular manner of their operation. I also claim the block aforesaid, on the inside of the engine, which

holds the back pressure of the steam, and its peculiar manner of construction and operation afore described; to the other parts of the machine I lay no claim."

Those who are acquainted with the construction of the many rotary engines which have been patented, will perceive that there is at least a very strong likeness between some of them and the foregoing, and an examination of the whole description will show the similarity to be perfect. There is to be a circular cavity, into which two, or more, sliding valves are to pass, and which are to be retracted in passing a block, or stop, which fills the cavity, and between which and the valves the steam is to operate. The valves are forced in and out by means of an eccentric groove, in which work pins that are attached to them.

One head of the cylindrical drum is to be rendered steam tight by packing contained in grooves. The valves also, it is said, may be packed, if necessary; but how this is to be done, we are not informed; yet it is a thing of no mean importance, as none of the numerous attempts to make a firm and durable packing for such parts have hitherto succeeded. As it is now nearly three years since this patent was obtained, we are apprehensive that the patentee has long since learnt that his machine will not answer its intended purpose.

For a *Revolving Cylindrical Harrow and Seed-cart;* James D. Woodside, city of Washington, July 28th, 1832.

We need not describe this machine, as a full account of it may be found at p. 21, in a report of the Committee on Science and the Arts of the Franklin Institute.

List of Patents supplementary to that for August, 1833, containing such as were then accidentally omitted.

WITH REMARKS AND EXEMPLIFICATIONS, BY THE EDITOR.

1. For improvements in the mode of *Combing, Heckling, and Slivering, Hemp, Flax, Tow, and other Fibrous Materials;* Joseph Westerman, and James Westerman, Brooklyn, King's county, New York; aliens, who have declared their intention to become citizens of the United States; August 14.

This is a machine of too much complexity to admit of description, without the aid of engravings; the drawings accompanying the specification are extensive and minute, the whole apparatus employed in the operation being fully shown; the parts, however, that present the most novelty, and upon which the principal reliance is placed, are denominated the "slot wheel, angular moving comb, and heckler." The points which operate upon the hemp, or flax, in combing and heckling it, are made to advance and withdraw therefrom by motions which appear to be perfectly well adapted to the purpose of laying the fibres straight, and disengaging themselves without entanglement.

The whole specification would fill, at least, twenty pages of this Journal; we shall dismiss it, however, with the following extract.

"By the above combination of machinery, an angular eccentric motion is given to the comb bars, by the combination of the guides and slot-wheel-plates, as above described; whereby, when applied to the heckling and combing of hemp, and other materials, a gradual increase of velocity is given to the comb bars, from the time they pass the top centre of the circle of their motion, until they pass the point of the angle of the guides, the comb bars supporting the hemp, or acting upon the hemp, or other material, until it is taken in by the drawing rollers; after which the comb teeth are withdrawn, or disengaged from the hemp, or other material, by a direct backward motion on the line of their line of direction; and in these particulars our inventions constitute improvements over all other machines for the heckling or combing of hemp, or other materials, to which we contemplate their application.

"We claim, therefore, as our invention and improvement, the combination of slot-wheel-plates and angular guides, formed and combined as aforesaid, by which these motions are to be produced, and by means whereof the comb bars are carried to any desirable nearness to the drawing and receiving rollers. And we claim also as our invention and improvement, the application of the said motions to the purposes of combing, heckling, and slivering hemp. flax, silk, tow, and other fibrous materials of the like nature, by whatever combination of machinery they may be produced."

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2. For an instrument for *Cutting, Paring, and Trimming, the Edges of the Soles and Heels of Boots and Shoes;* Ira Hatch, Essex, Chittenden county, Vermont, August 15.

A paring knife is fixed to a stock, furnished with a suitable handle, and a gauge, adjustable by screws, regulates the cut of it. The claim is to "the gauge, secured by a stock, to graduate the cut of the knife, to prevent it from coming in contact with the upper leather, and to leave the edge of the sole leather true and smooth, as required in cutting, paring, and trimming, the edges of the soles and heels of boots and shoes."

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3. For a *Gun Lock;* Robert H. Faunt Le Roy, Posey county, Indiana, August 15.

The patentee says, "The principle of which I claim the discovery and invention is, that a gun-lock can be constructed containing such machinery, (to which I have applied the term *relief*,) as will supersede the use of double triggers, which machinery, or relief, is so combined with the lock as to be always ready when the lock or gun is cocked, and which is put into that state of readiness by the operation of the lock itself, thereby saving the time and trouble usually spent in springing, or setting, the double triggers now in common use."

For carrying this principle into operation, there are four different plans suggested, which are represented by four several drawings;

without these, the particular arrangements specified could not be understood.

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4. For a *Worm Specific;* Charles M'Lane, Morgantown, Monongalia county, Virginia, August 19.

"Take of American cold pressed castor oil, 12 ounces.
Wormseed oil, ... 1½ ounce.
Croton oil, ... 22 drops.

Agitate these well in a bottle sufficiently large; then add of pure sweet oil four ounces; medicamentum, or oil of Haarlem, one bottle, (containing nearly half an ounce;) and the same quantity of oil of spike; then shake them thoroughly together, until the ingredients are incorporated.

"Give the patient (when from two to ten years old) a tea-spoonful of this medicine, in the same quantity of sweetened water, every morning on an empty stomach," &c.

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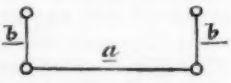
5. For a *Machine for Cutting Straw;* Joshua Davis, Marysville, Charlotte Court House, Virginia, August 19.

In this machine there is to be a number of straight knives, placed at such distance from each other as shall be equal to the length of the straw to be cut. These knives are attached at each end, by means of joints, to a swinging arm, and the arms are also jointed at their upper ends to standards, making part of the frame work; the knives at their lowest point stand in the position shown at *a*, the swinging arms, *b b*, being at right angles to them. A lever, like a pump handle, is attached to one of the arms, *b b*, and serves to bring the knives down with a swinging motion; as they descend, the knives cut against bars placed on the bed of the machine, thus producing as many lengths of cut straw as there are knives, which straw falls through between the bars. The claim is to the general construction of the machine.



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6. For an improvement in *Fences;* Samuel F. Dexter, Auburn, Cayuga county, New York, August 19.

The fence is to be made of wire, and directions are given for fixing posts, or standards, either of wood, or of hoop iron. There is no claim made, the whole subject being treated as though wire fences had never before been known; they are old, however, both at home and abroad; that is, the plan is old, but we do not know that there are any old fences upon this plan, as it has been generally abandoned.

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7. For *Cisterns for Water;* Samuel Booth, Syracuse, Onondaga county, New York, August 20.

A round pit is to be dug somewhat larger than the intended cistern, and at the bottom of this a temporary floor of rough plank is to be placed, forming a circle which will not reach to the sides of the pit;

rough boards are then to be set upright, like the staves of a tub, their inner sides touching the temporary floor, and earth is to be rammed in between their outer sides, and the sides of the pit, until the space between them is firmly filled. The temporary floor is then to be removed, and the bottom of the pit covered with hydraulic cement; the surrounding boards are to be plastered with the same, and their upper ends also covered. The patentee says:

"What I claim as my invention, is the before described mode of forming hydraulic cement cisterns upon a frame of rough wooden staves set up in the pit, without head, hoop, or being jointed, depending upon the cement alone to hold the water, which it will do after the wood shall have decayed."

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8. For a *Safety Guard for Gun Locks;* Heinrich Backmann, Lancaster, Lancaster county, Pennsylvania, August 21.

The guard described in the specification appears to deserve the name, as being well calculated to secure the piece to which it is attached against accidental discharge. It is so formed that the lock is never upon half cock; the description of it is clearly given, and although there is no formal claim, the nature and object of the invention are fully shown. The particular arrangement described, would require the drawing for its illustration.

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9. For *Keys for Musical Instruments;* Edward Riley, city of New York, August 22.

The keys here meant are of the kind used on flutes, clarionets, &c. The first improvement claimed, consists in placing a small roller under each spring, attaching it to the instrument by means of a wire, thus diminishing the friction, and rendering the action more lively. The next improvement consists in "the position of the three lower keys of a keyed German flute; to wit, the juxtaposition at the upper extremity of the D key, the C natural, and C sharp keys, so as to bring the said extremities all under the same touch of the little finger, by placing the D key directly under the extremity of the other two keys." The third is the peculiar form of the lower C key, and the C sharp key, so that both may be brought down upon the holes simultaneously. All which are fully explained, and represented in the drawing.

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30. For a *Machine for Cutting Grain, Grass, &c.;* William and Thomas Schnebly, Hagerstown, Washington county, Maryland, August 22.

The grain, or grass, is to be cut by blades working upon joints, like shears; these shears cut against projecting pieces, which stand out, like large comb teeth, from the advancing part of the machine; the principle is by no means new, although there is considerable peculiarity and novelty in some of the arrangements. The cutting blades are made to vibrate, as in similar machines, by motion communicated to them from the wheels. The claims are to "The reel

of open spaces and solid surfaces. The double edge shear. The roller setting on springs. The revolving plane, or sheet, or scraper. The projections or divisions of the grain."

One, at least, of the things claimed is old, namely, "The double edge shears;" the others may be new, but we cannot give a particular description of them in the space to which we must limit ourselves.

SPECIFICATIONS OF AMERICAN PATENTS.

Specification of a Patent for a Stove for Burning Anthracite. Granted to DENISON OLMSTED, *New Haven, Connecticut, November 5th,* 1834.

To all to whom these presents shall come, be it known, that I, Denison Olmsted, of the city of New Haven, and State of Connecticut, have invented a new and useful improvement in the construction of stoves for burning anthracite coal; for which improvement and invention I claim a patent, according to the laws of the United States.

And I, the said Denison Olmsted, do hereby declare the nature of my said improvement and invention, and the manner in which the same may be carried into effect, are fully made known in the following description and specification.

For *generating* the heat, I employ an anthracite coal stove, of ordinary construction, so far as relates to the chamber of combustion; but I prefer one made of sheet or cast iron, (I at present use sheet iron,) lined with fire brick, or lute. For *distributing* the heat, I use, instead of the open iron pipe generally employed for that purpose, a peculiar kind of apparatus, which I call a Radiator, constructed as follows.

A radiator consists of two concentric cylinders of iron, either sheet or cast iron, between which and around the inner cylinder, the heated current proceeding from the stove, circulates. Calling the outer cylinder A, and the inner cylinder B, their connexion, or arrangement, may be thus described: A, being a cylinder of any required dimensions, (as, for example, 24 by 9 inches,) and B a similar cylinder, but of smaller dimensions, (as, for example, 21 by 5 inches,) the two are placed upright; the top of B is brought to a level, or in the same plane, with the top of A, (although it is not essential that they should be in the same level at top, but this is the common construction,) being situated within it, and concentric with it, and reaching to within a few inches of the bottom of A. The inner cylinder, B, is closed at bottom, but open at top. The circular ring, or space, between the two cylinders at top, is closed, and a partition is inserted up and down on opposite sides of the inner cylinder, and the whole length of it, dividing the space between the two cylinders into two parts, so that the heated current, before mentioned, may descend on one side, and ascend on the other.

In order to distribute the heat from the inner cylinder, an air pipe is inserted in, or near, the bottom, which penetrates both cylinders,

and, being open at both ends, permits the internal air of the apartment to flow into B, as the air within B becomes rarefied by heat. Instead of the air of the apartment, fresh air from another apartment, or from out of doors, may be introduced through the air pipe, or the circulation of air through this pipe may be increased by elongating B upwards, by means of a pipe attached to it. A smoke pipe proceeds from the outer cylinder, A, near the top, which communicates either directly or indirectly with the chimney.

The radiator thus constructed being connected with the stove before described, by a short pipe, (the stove and the radiator usually stand side by side,) the heated current, when the stove is in action, passes through this pipe into the radiator, descends between the two cylinders, flows into the inner cylinder, B, ascends on the other side, and passes out at the smoke pipe, near the top of the radiator.

In order to remove such ashes as may be deposited from the heated current on the bottom of the outer cylinder, A, a small opening, closed by a door, or plate, is made in or near the bottom of A.

The stove above described is susceptible of various forms. The following are given as examples, viz.

1. We may employ a *single radiator*. In this case, we may either have smoke-pipes attached to both the stove and the radiator, each being furnished with a damper to regulate, or to exclude, the draft; or we may have but one smoke-pipe, namely, that communicating between the radiator and the chimney.

2. We may employ *two radiators*, one on each side of the stove. From each radiator, and from the stove, pipes enter the flue of the chimney, either directly or indirectly, each pipe being furnished with a damper. A convenient arrangement is to place the whole apparatus, namely, the stove and radiator, or radiators, parallel to the breast of the chimney, on the hearth, for example; and the fireplace being closed, to let the three pipes enter by apertures, left so as to form an opening into the flue of the chimney.

3. Where the communication with the flue of the chimney is made by means of a long smoke-pipe, the smoke-pipes from the radiators may be made to enter this pipe behind the damper, instead of entering directly into the flue of the chimney.

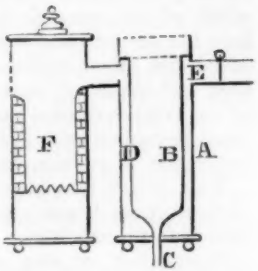
What I claim as new in the stove just described, is the use of a drum, or drums, of peculiar construction, so combined with the part of the stove which generates the heat, as to afford a new and very advantageous mode of distributing the heat.

I do not claim any thing new in the structure of the stove, that is to say, the part that generates the heat, otherwise called the chamber of combustion; nor do I claim the use of concentric cylinders, for distributing heat, as a new invention; but this peculiar structure of the drum, and its immediate connexion with the stove, as a substitute for the open pipe, or pipes, usually employed to distribute the heat generated in stoves for burning anthracite coal, I claim as a new and useful invention, being peculiarly economical, convenient, and efficacious.

DENISON OLMSTED.

Section of the Stove with one Radiator.

A, the outer cylinder of the radiator.
B, the inner cylinder.
C, an opening by which air may enter the inner cylinder.
D, space between the two cylinders, vertical partitions in which compel the draft to descend on the side next the stove, and to ascend on the opposite side, to pass off by the smoke-pipe, E.
F, stove of the ordinary construction.



Specification of a Patent for a Machine for Hulling Clover, and other Seed. Granted to WILLIAM C. GRIMES, *of York, in the county of York, in the State of Pennsylvania, November 8th,* 1834.

To all to whom these presents shall come, be it known, that I, William C. Grimes, of York, in the county of York, and State of Pennsylvania, have invented a new and useful machine for hulling clover and other seed, and that the following is a full and exact description of the construction and operation of the said machine.

In a suitable frame, or husk, I affix a vertical spindle, or shaft, similar to the spindle of a mill stone; upon or near its upper end, I put a conic formed wheel, which I call the runner, it being in the form of a low, or obtuse cone, the upper surface rising at an angle of about twenty degrees from the horizon, (more or less.) Over this I place a hollow or inverted cone of wood, metal, or other material, the inner surface of which is to approach within an inch (more or less) of the surface of the runner. The whole surface of the latter is to be covered with punched sheet iron, or coarse emery, or made rough by other means. Attached to the inner surface of the cap, or inverted cone, are strips of metal, which commence at the rim, and run in obliquely towards the centre; these strips are to be fastened by their edges to the inner surface of the cap, or inverted cone, their width being nearly equal to the space or distance between the cap, or inverted cone, and the runner; leaving just space enough for the seed to pass through between their lower edges, and the roughened surface of the runner, without being bruised. The number of strips, or stops, as they may more properly be called, will depend upon the diameter of the inverted cone; the distance also from one to the other may be very much varied, but from three to four inches I think a suitable distance. The length of the said stops should be about two-fifths of the diameter of the runner, and their obliquity should be such as to cross at right angles, (or nearly so,) a tangent line, which should commence at the preceding stop.

In the centre of the top of the cap, is made an oblong or long oval

opening, like a small hopper, or funnel, which crosses the top of the runner, and extends about one-third of the way down its sides; the width of this opening is about one-third or one-half of its length. Into the said opening is fixed a kind of shallow hopper, the sides of which rise at an angle of about forty-five degrees from a vertical line, and are about three or four inches in width. The lower edge of the hopper is fitted down to the form of the runner, but does not come in contact with it, there being left all round a space of about one-eighth of an inch, for the admission of the unhulled seed.

The before mentioned spindle upon which is the said runner, has on or near its lower end a pulley, or strap wheel, which is to give motion to the machine. The lower end of the said spindle runs in a suitable box, or step, which is fixed upon a bridge-tree, similar to that of a flouring mill. Above, the spindle may run in a box, or bush, beneath the runner, or it may pass up through the runner, and be properly supported above; the latter, I think, is the best mode, as it will keep the runner more steady, and be much more easily kept tight in the box, and more convenient to oil, &c.

The following is a description of the principle of action of the before described machine. The unhulled seed should be let into the before mentioned shallow hopper in a continuous stream, the runner moving with great rapidity, say eight hundred revolutions per minute; its roughened surface draws the unhulled seed as fast as the same falls upon it, under the edge of the said hopper, while at the same time, if a nail, or stone, &c. falls into the hopper upon the runner, the latter throws it with such force against the inclined sides of the hopper, as to cause it to bound out, and to a distance from the hopper; hence such things as would otherwise be injurious to the machine, cannot enter it. Effectually to ensure this effect, the funnel-like opening may be lined with tin, or be otherwise made perfectly smooth.

The unhulled seed, after passing into the machine, or between the cones, passes under the edges of the said strips, or stops, when, by the impetus it receives from the runner, its projectile and centrifugal force causes it to leave the surface of the runner, and come in contact with the flat side of the next succeeding stop, by which its motion is arrested, and it falls down upon the rough surface of the runner, which in this way rasps or tears the hull from the seed.

The cap, or inverted cone, has a rim or flanch upon its lower edge, which surrounds the periphery of the runner, and upon which the former is supported. Suitable flooring is made just below the runner, and upon this flooring rests the rim of the cap, or inverted cone. A spout like that of a flouring mill, but of much larger capacity, is fixed at one side of the runner, opening into the space between the edge or periphery of the runner, and the rim or flanch of the cap, or inverted cone; which space may be about one inch, (more or less.)

The seed and hull, as they are discharged from the machine, may be conducted to, and be operated upon by, fans of the usual construction, to separate the hull, or chaff, from the seed.

The feeding may be effected in any convenient way, as by a re-

volving screen, or a feeding roller, running in a box or hopper above that of the machine.

What I claim as new, and as my invention, and for which I ask an exclusive privilege, is the before described machine for the hulling of clover, or other seed, upon the roughened surface of a rapidly revolving cone, having a cap, or cover, furnished with strips, or stops, operating upon the principle described, and thereby arresting the motion of the seed, whereby the conic runner with a high velocity effects the hulling of the seed, and, by the aid of the hopper, or funnel, at the apex of the cover, constructed in the way set forth, throws out any hard substance which would be sufficiently large to injure the machine.

I do not claim the covering of a revolving cone with perforated metallic plates, or the rendering the surface thereof rough in any other way; nor do I claim either of the parts of the before described machine taken individually, but only that arrangement and combination of their respective parts, by which a machine is constructed substantially like that herein set forth, so as to produce the same effect, upon the same principle.

WILLIAM C. GRIMES.

Specification of a Patent for a Machine for Hulling Clover Seed. Granted to WILLIAM C. GRIMES, *of York, in the county of York, and State of Pennsylvania, November 8th,* 1834.

To all to whom these presents shall come, be it known, that I, William C. Grimes, of York, in the county of York, and State of Pennsylvania, have invented a new and useful machine for hulling clover seed, and that the following is a full and exact description of the construction and operation of the said machine, as invented by me.

Upon a vertical spindle, or shaft, similar to that of a grinding mill, is fixed a wheel, or runner, the upper surface of which is made in the form of a low or obtuse cone, rising at an angle of about twenty degrees from the horizon, (more or less,) thus far being similar in form to the old-fashioned stone rubbers for hulling clover seed. Over the runner is placed an inverted cone, or cap, fitting on to the runner; the two surfaces, however, of the cap and runner, are not to approach nearer than about an inch, (more or less.) Into these contiguous surfaces or faces of the cap and runner, are driven concentric rows or circles of teeth, which last may be common cut spikes, or other suitable material. The space between these concentric circles or rows of teeth, may be an inch and a fourth, (more or less.) The teeth on the runner work between those in the cap; hence the said concentric rows of teeth on the runner and cap, when fixed for operation, are alternate, those of the runner standing up between those of the cap, and those of the latter projecting downwards, between those of the former; thus bringing the alternate rows to within about five-eighths of an inch from centre to centre, and leaving in the clear

about three-eighths of an inch, if the teeth are a fourth of an inch thick, which I think a suitable size. The teeth in the rows are usually placed about three-fourths of an inch the one from the other, but the distance may be very much varied, and the number of circles, or rows of teeth, in the cap, may correspond with those in the runner. The diameter of the runner may be very much varied, as from one to ten feet; but from three to five feet I think the most convenient.

Instead, or in place of, the concentric rows of spikes, or teeth, I intend sometimes to use hoops of rolled iron, fastened by their edges to the cone, and punched full of round holes, or the holes may be oblong, standing up and down; and also to cut or file teeth upon the edges of the said hoops.

The teeth occupy only about one-half of the diameter of the face of the wheel, or runner, but much more than half its surface, as the rows or circles of teeth commence at or near its periphery, and extend about half way to its centre; the remaining part of the face of the runner, that is, around the centre, extending to about one-half of its diameter, is covered with punched sheet iron, or made rough by other means, as with emery, or otherwise.

The runner and cap may be made of wood, metal, or other material; when made of wood, they may be built up of successive layers of plank or boards, the grain of each succeeding layer crossing that of the preceding: when made of metal, they may be cast to the proper form, with no greater thickness than what may be necessary to have the requisite strength. The teeth may be cast in the cone, or the latter may be drilled, and the teeth put in afterwards.

A vertical rim from the periphery of the concave cap, surrounds the runner, leaving a space of about an inch between the periphery of the runner and the inside of the rim. A spout similar to the spout from a flour mill, but of much larger calibre, or capacity, is let into the aforesaid space, for the purpose of discharging the seed and chaff from the machine, and conducting them to the fans; said fans may be of the ordinary construction, for the purpose of separating the chaff from the seed, but should be sufficiently large to suit the capacity of the machine.

Through the top or centre of the cap is made an oblong or long oval opening, crossing the centre of the runner, and extending each way as far, or nearly, as the roughened surface of the runner. The sides of this opening rise at an angle of about forty-five degrees from a vertical line, and may be lined with sheet iron, or other metal, which lining is to approach to within about one-eighth of an inch of the roughened surface of the runner, and rise about three or four inches above it. The object of having the sides of the opening in the cap inclined, and the lining approach near to the runner, is to prevent large and hard bodies, such as stones, &c., from passing into the machine to injure the teeth. When stones, nails, or sticks, &c., happen to fall in upon the roughened surface of the runner, the latter throws them against the inclined sides of the opening in the cap, with such force as to cause them to bound to some distance from the opening; even small straws are thrown out in this way; yet, notwithstand-

ing this, the chaff and seed are drawn in with great rapidity. The spindle of the runner may run in a box or step beneath, upon a bridge tree, like the spindle of a mill, and be supported above in a suitable box, or bush; or the spindle may pass up through the opening in the cap, and be supported in a suitable box above. The length of the said spindle ought to be at least as great as the diameter of the runner; and upon and near the lower end thereof, I put a pulley, or strap wheel, which is to give motion to the runner, which should have from five to twelve hundred revolutions per minute, according to its size, and other circumstances.

What I claim as new, and as my invention, in the before described machine for hulling clover, and for which I ask an exclusive privilege, is the concentric rows of teeth, placed in circles upon the cones, in the manner described; or instead thereof, hoops toothed and punched so as to operate between each other in a similar way, and produce a like effect. I also claim the general arrangement of that part of the machine by which the feeding is effected, and whereby stones, or other foreign substances, are thrown therefrom.

WILLIAM C. GRIMES.

Specification of a Patent for a Machine for thrashing and rubbing out Wheat. Granted to STACY WEST, *of the county of Hartford, in the State of Maryland, November 11th,* 1835.

To all whom it may concern, be it known, that I, Stacy West, of the county of Hartford, and State of Maryland, have invented a new and useful machine for the purpose of thrashing, or rubbing out, wheat, rye, and other small grain; and I do hereby declare that the following is a full and exact description thereof.

I construct a suitable frame, of strength sufficient to bear the stress which is to be put upon it. This may consist of four corner posts, into which are strongly framed the requisite side and end pieces. Upon this I mount four or more cylinders, by means of which the thrashing, or rubbing out, is to be effected. I in general use four cylinders only, and to this number I shall confine my description, although six, or more, may be used upon the same principle, but, I apprehend, without any adequate advantage.

For a machine of ordinary size, these cylinders may be each thirty inches long, and seven or eight inches in diameter. They may be made of cast iron, in one entire piece, but I usually make them of wood, and cover them with ribs of iron extending from end to end, so as to form the surface into flutes and ridges. The ridges may be about three-fourths of an inch apart, and the flutes by which they are separated about the same in depth. The edges of the ridges are to be notched, or serrated, forming teeth upon them their whole length.

The cylinders are placed horizontally, and turn upon gudgeons in suitable boxes, or bearings; a line uniting their gudgeons would form a quadrangle, there being two upper and two lower cylinders, forming two pairs, one lower and one upper being denominated a pair. I

call that the front of the machine where the straw is delivered, and that the back where the feeding is effected. The two front cylinders mash into each other, by means of their ridges and flutes, and would turn each other like the teeth of a wheel; but as they are not to touch, they are not allowed to do this, they being kept in their relative situations by means of the wheels on their gudgeons by which they are geared together. The two front rollers are placed at the distance of about half an inch from the two back ones; they run with very different velocities, and must not, therefore, interfere with each other. In a machine which I have constructed, these velocities are as six to one, which I think a good proportion; but this is a point which admits of considerable latitude.

I do not, in general, place the pairs of cylinders directly one over the other, but bring the lower back cylinder so far forward, that its centre is nearly under the space between the two upper ones, advancing the lower front cylinder in the same manner; the intention of this is to bring the lower back, and the upper front, cylinders nearly, but not quite, into contact with each other, as this materially aids in the operation of thrashing, much of the grain being rubbed out between these diagonal cylinders, before it passes between the two front ones, where it is completed.

The feeding is effected between the two back cylinders by means of a feeding table, or feeding apron, in the ordinary way.

The manner of gearing the cylinders, for the relative velocities above spoken of, is as follows. Upon one of the gudgeons of the upper back cylinder there is a cog wheel, of such size that it mashes into a pinion of one-sixth of its diameter, on the gudgeon of the lower front cylinder. At the other end each of the pairs of cylinders are geared together by wheels, or pinions, of equal size. Motion may be given to them by a whirl and band, or otherwise.

The bearings of the upper gudgeons are made capable of being raised by means of wedges, or screws, to regulate the distances of the pairs of cylinders to the kind of grain to be got out.

To admit of the receding of the cylinders from each other, in case of the introduction of any hard substance between them, I place on each side of the frame, and resting upon the boxes of the upper cylinders, an elastic bar, or strip, of wood, reaching the whole length of the frame, and confined at its two ends. These pieces may be about two and a half inches square, more or less, according to the nature of the wood employed.

To the front cylinders I usually give a velocity of from three to six hundred revolutions per minute; the effect, however, does not depend upon the velocity, as the grain is not beaten, but rubbed out, the back cylinders holding it, whilst this is effected by the more rapid motion of the front cylinders.

I do not claim any of the parts of this machine taken separately, the cylinders, wheels, and other parts, being such as have been before used for various purposes; but what I do claim is the employment of two or more pairs of cylinders, moving with different velocities, constructed in the manner, and applied to the purpose, hereinbefore set

forth. Not intending, however, to limit myself to the precise mode of construction and gearing which I have designated, but to vary the same in any manner in which a similar effect is produced by the application of the same general principle.

STACY WEST.

TRANSLATIONS FROM FOREIGN JOURNALS.

REPORT

To the Board of Directors of Bridges, Public Roads, and Mines, upon the Use of Heated Air in the Iron Works of Scotland and England. By M. DUFRENOY, *Engineer of Mines. Paris*, 1834.

[Translated for this Journal, by S. V. Merrick.]

Continued from p. 357.

REMARKS UPON THE NATURE OF THE COAL EMPLOYED IN THE FURNACES USING CRUDE COAL.

It results from the preceding description, that certain coals, those of Wales, are employed in their natural state, for the fusion of iron ore in the smelting furnaces in which combustion is sustained by cold air.

That a great number of others—the coals of Glasgow, for example—are also susceptible of being used in the crude state, when the hot blast is employed; but that, for some varieties, the transformation into coke appears still to be indispensable, whatever be the plan on which the iron is made. To appreciate the causes which produce these remarkable differences in the properties of these coals, I have collected samples of most of those employed in the works spoken of in this report, which M. Berthier has analyzed in the laboratory of the School of Mines, and the results of which he has communicated.

Coal employed in the crude state in the Welsh Iron Works. Cold Blast.

	Dowlais.	Cyfartha.	Pen-y-danau.
Carbon,	0.795	0.784	0.768
Ashes,	0.030	0.028	0.032
Volatile matters,	0.175	0.188	0.200
	1.000	1.000	1.000

The coal of Dowlais is lamellar, separating across the layers in smooth and brilliant plates. This coal is composed of two distinct parts, one brilliant, dividing into small cubic fragments; the other, completely hard, fracture conchoidal, is nearly analogous to the Cannel coal.

These two varieties do not blend, but form in each strata small beds of greater or less thickness; the brilliant part greatly predomi-

nates. The Dowlais does not soil the fingers; it swells very little in coking, and does not cake; the ashes are perfectly white.

The *coal of Cyfartha* is rather slaty, or lamellar, but is composed, as the preceding, of the union of the brilliant and compact black parts, intimately mixed, like the quartz and feldspar crystals in granite.

These two varieties of coal act very differently; that having a brilliant fracture swells and cakes sufficiently, whilst the dull kind is dry, and does not change by exposure to the fire. It is probably this mixture that gives to the coal employed at the Cyfartha works, the property of resisting more than any other the action of the blast, and the different movements which take place in the furnace; its friability is also due to this circumstance; but the bitumen, which exists in sufficient abundance in the shining coal, cements the different parts of this coal, and gives it a great solidity after having been exposed to the fire.

The *coal of Pen-y-danau* has the same properties as the preceding, except that the mixture of the two kinds is less intimate. These three coals, belonging to the coal basin of Wales, are very dry, and owe this property to the excess of carbon which they contain; they are analogous to the coal of Rolduc.

Coals employed in a Crude State, in Furnaces worked with Heated Air.

	Environs of Glasgow.			Staff'd shire.	Derbyshire.	
	Clyde.	Calder	Monk-land.	Tipton near Wed'y	Butterly	Codnor Park.
Carbon,	0.644	0.510	0.562	0.675	0.570	0.515
Ashes,	0.046	0.040	0.014	0.025	0.030	0.030
Volatile matters, Water,	0.005	0.039	0.115			
Volatile matters, Gas,	0.139	0.081	0.094	0.300	0.400	0.455
Volatile matters, Tar,	0.166	0.330	0.215			
	1.000	1.000	1.000	1.000	1.000	1.000

The *coal of the environs of Glasgow*, employed in the Clyde, the Calder, and the Monkland works, present characters sufficiently marked, and of a composition very analogous, as seen by the preceding table.

This coal is usually dull, a little compact, hard, and does not crumble between the fingers; it presents, in its transverse fracture, a series of small lines, which gives a slaty appearance, though it does not, in reality, possess this quality. It is very well stratified, and the lumps cleave in flat fragments, of greater or less thickness; the surfaces of separation are almost always marked by black carbonaceous

matter, which soils the fingers, and resembles charcoal in its fibrous appearance, and dull colour.

This coal is often traversed by extremely thin fillets of carbonate of lime, the direction of which is perpendicular to the layers, and sometimes pyrites is found.

The pieces of Glasgow coal submitted to analysis, softened but slightly; they cement together without change of form.

The *coal of Tipton*, which supplies the works of Lloyd & Forster, near Wednesbury, is slaty; it is composed of small beds, a few lines in thickness, separated almost always by an extremely thin bed of black carbonaceous matter, like charcoal. This substance is so abundant, that a piece of coal is rarely found at Tipton, more than four inches thick, which does not present one or two layers of this friable material. This coal, shining in its fracture, divides into small pseudo-regular fragments; it is slightly tenacious, and swells but little in coking.

The *coals in the environs of Derby* are divided into two principal qualities, designated under the names of *Cherry coal*, and *Soft coal;* the first, which is the harder, resists the action of the fire better than the second. The furnaces of Butterly, which use heated air, consume the Cherry coal exclusively; this coal is slaty, and presents lines of dull black, which gives it a strong resemblance to the coals of Scotland.

The soft coals, employed principally for steam engines, and puddling furnaces, are used also, at Codnor Park, for the roasting of ores. This coal is shining, slaty, and separates in pieces by very light pressure; it contains some thin portions of black and friable carbonaceous matter, already alluded to.

Notwithstanding the considerable loss which these two coals sustain by coking, they scarcely change their form; they swell and cake slightly, and their ashes are perfectly white.

Coals that appear to require transformation into Coke, when employed even in Furnaces worked with Heated Air.

	Birtly Works, near Newcastle.	Tyne Works, Northumberland.	Apdale Works, near Newcastle, Staffordshire.
Carbon,	0.605	0.675	0.624
Ashes,	0.040	0.025	0.035
Volatile matters,	0.355	0.300	0.341
	1.000	1.000	1.000

The coal consumed at the Birtly and the Tyne Iron Works, comes from the mines in the environs of Newcastle-upon-Tyne; it is shining, and splintery; it does not soil the fingers, nor does it crush by a light pressure.

This coal is, in general, very pure, containing no veins of carbonate of lime, or pyrites; it is very adhesive, and swells much by the action

of heat, so that the value of the coke exceeds that of the coal employed. I am assured at the Tyne works, that they have tried in vain to work Newcastle coal in the crude state.

The coal of the *Apdale Works* is lamellar, shining and splintering in the direction of the strata; it divides into small quadrangular fragments; in the cross fracture, it presents large bands, perfectly smooth, and very brilliant. This is owing to the super position of small layers, of which the nature is a little different; this coal is very adhesive, swells in the fire, and gives a light, silvery, but very solid, coke.

If we compare the composition of the different coals that we have examined, we perceive—

1st. That the coals employed in a crude state, in the furnaces worked with cold air, are dry, very carbonaceous, and, in fact, true anthracites.

2d. The coals, as those of Scotland and Derbyshire, which, though bituminous, serve, in a crude state, for the fusion of iron ore in the smelting furnaces worked with heated air, are, however, still dry coals.

3d. Finally, the fat, bituminous, adhesive coals, which change their volume, and swell by the action of fire, appear still to require a transformation into coke, to give advantageous results in the smelting of iron ore.

Quality of the Pig Iron and Bar Iron obtained in the Works using the Heated Air Blast.

The iron for castings made in Scotland, bears a less commercial value than that of Staffordshire. The first were quoted in the Liverpool market, in the month of July (1833) last, at 4*l.* 15*s.* sterling per ton, whilst the Staffordshire iron sold, at the same time, for 6*l.*

The difference between the price of these kinds, together with the prejudice generally entertained that the hot blast is unfit for the manufacture of iron, led some to doubt the advantages to be derived from the new method. The numerous observations I have made, tend, on the contrary, to prove that, for cast iron, at least, the products of the furnace working with heated air, are superior to those of the cold blast. The less value of the Scotch iron is no evidence against this opinion. In fact, the Staffordshire iron has always been regarded as the most suitable for castings, and has always borne a higher price than that from most of the other parts of Great Britain; perhaps, also, the great difference in price between the Scotch and Staffordshire irons, may be accounted for by commercial circumstances, for the Scotch now make iron much cheaper than others, and the production being increased almost one-third, by the employment of heated air alone, the iron masters have thought it to their interest to reduce the price of their iron, which they are enabled to do without loss.

It would be desirable if this important question could be decided by direct experiments; but for want of such, I will state the uses of these

different products in the arts—uses which are, perhaps, as conclusive as experiments.

In the works near Glasgow, they make iron only for the foundry; I have seen the iron which they produce employed for the manufacture of castings, which require great strength and softness, to wit: steam engine cylinders, boilers, gas pipes, mill gearing, &c.

At Birtly, near Newcastle, and at Butterly, near Derby, I have also seen steam engine cylinders, pipes for water pumps, and fastenings for iron bridges.

I should state that the furnace of Torteron, at the Fourchambault works, in the Nievre, produces, since the use of this plan, gray iron, which competes in the market with that from England.

The iron manufactured from hot blast pigs, is also of very good quality.

At Codnor Park, near Derby, this iron is employed in the construction of different parts of the steam engine, of chains for suspension bridges, and of straps and cross-bars in iron bridges.

The iron produced at the Tyne works is wrought into sheets, for steam boilers, gasometers, &c.

At Wednesbury, the iron is also of good quality, and serves for purposes which require great strength.

These different examples prove that, by means of the hot blast plan, as well as by the old mode, superior metal can be made for foundry purposes, and which is well adapted for conversion into wrought iron; but it must not be thought that, by means of this plan, the faults which result from the nature of the ore, or coal, can be corrected.

Probable Causes of the Increase of Heat, due to the Use of Heated Air.

I have remarked several times, in the course of this report, that the temperature of the furnaces worked with heated air, appears to be higher than in those where combustion is sustained by the use of cold air; all the indications which are usually considered as guides for the working of the furnace, unite in proving this assertion.

The scoria does not attach itself above the tuyeres; the colour of the fire, in this part of the furnace, is so white as to be injurious to the eyes; the scorias, which are very liquid, flow with facility; the metal being hotter, can be cast directly into the most delicate objects. The quantity of ore in each charge is augmented in a great proportion, whilst the quantity of flux is decreased. This diminution in the proportion of melting is, of itself, the strongest proof of the increased temperature of the furnace; it indicates to us that the earthy matters find sufficient heat to fuse with a small addition of flux.

Probably it is to this excess of temperature that we should attribute the faculty of employing certain coals in a crude state, the transformation of which into coke appeared indispensable, at a less elevation of temperature.

In spite of these certain proofs of the increased temperature by the introduction of hot air into the furnaces, we cannot demonstrate its existence in a positive manner; but it appears to me that, to a certain point, a reason for this phenomenon may be given, by comparing that which passes in the furnace, by the constant introduction of air, to that which takes place by the mixture of two liquors of different temperatures, which we know will produce a mean temperature. The comparisons which I establish appear to me to be just, though the furnaces are in circumstances very different from the liquids having a given temperature, because the heat is reproduced without intermixture, by the combination of carbon and oxygen.

By admitting this cause of the augmentation of heat, it might be supposed to be very slight; on account of the great difference which exists between the temperature of the furnace, and that of the air which sustains the combustion; a difference that we have no accurate means of appreciating. I will show hereafter that this cause is not so feeble as might at first be supposed.

There is, I believe, another much more powerful cause, which it is impossible to estimate; it results from combinations, which could not be produced at the ordinary temperature of the furnace, and which are developed by the augmentation of heat due to the substitution of hot for cold air.

We see constantly, in our laboratories, examples of this phenomenon; substances which are acted upon slowly, and with much difficulty, by acids, at the temperature of the atmosphere, dissolve with facility when the liquor is slightly heated, and the combination formed often becomes itself a powerful source of heat. The operation of the smelting furnaces presents to us, perhaps, similar circumstances. The bitumen, and certain gases, which cannot burn at the temperature of the furnace using cold air, become ignited by the feeble augmentation of heat produced by the introduction of heated air; and the little smoke which passes out from the trunnel head when crude coal is consumed, and also the colour of the flame, authorizes the belief that the bitumen, the hydrogen gas, &c., are almost wholly consumed.

This supposition naturally answers the objection that may be made, that, even admitting a certain augmentation of temperature by the introduction of heated air, there can be no diminution in the quantity of fuel consumed, because the diminished amount of fuel used in the furnace is compensated for by that required to heat the air.

We have stated that the quantity of air injected into the furnace could, by its great mass, have the power of cooling it to a considerable degree.

This mass of air was raised in the Scotch works, before the adoption of the hot air plan, to 2800 cubic feet per minute, weighing 214¼ pounds. The quantity of air injected in each day, therefore, may be estimated at about 140 tons.

The total amount of coal, mineral, and flux, does not exceed thirty-four tons; the weight of air, therefore, injected into the furnace, is

more than four times that of the solid materials used in the same time.

We may conceive, therefore, that so considerable a mass, of which only a fifth part sustains combustion, thrown into the furnace at the mean temperature of the atmosphere, will produce a much greater refrigeration than when raised to the temperature of more than 600 degrees.

A circumstance which still tends to diminish, in a great degree, the refrigerating power of the air, by the use of the new plan, is, that the quantity of air is much less. In the furnaces of Scotland that we have taken for example, the quantity is reduced from 2800 cubic feet, to 2100 per minute, or twenty-five per cent.*

We can calculate the influence of the introduction of air upon the heat developed each instant, by the combustion of carbon; but it appears impossible to appreciate the augmentation which results from new combinations, caused by the combustion of the bitumen and carburetted gases, because we cannot, in the present state of the science, estimate the temperature in the interior of the furnace; the few observations that precede, though not giving any idea of the real influence of the heated air, appear to me, at least, to establish that it is very considerable.

Recapitulation.

The details into which I have entered upon the greater part of the works using heated air, have, perhaps, prevented the reader from seizing the principal circumstances of the plan; I deem it, therefore, useful to recapitulate briefly—

I. In all the works, with the exception of one or two, its introduction has resulted in an increase of the products, an economy in the consumption of fuel, and of flux, as well as in the expense of labour, and incidentals.

II. These advantages have followed in the same progressive ratio as the temperature to which the air has been heated.

III. The production of metal has generally increased.

* The specific heat of water being represented by 1.0000, that of the atmospheric air is 0.2669, from which it results that a gramme of air at 322° Cent., (612° Fah.) the temperature at which the air is injected into the Clyde furnace, would raise 0.733 gms. of water to 100°, (212° F.) supposing the air reduced to 10°, (60°;) and as the quantity of air introduced each minute is 124,779 gms., the heat which results from this mass is represented by 91,463 gms. of water, raised to 100°.

The charges at the Clyde works are now 34,416 kilogrammes of coal in twenty-four hours, or 23.90 kil. per minute, which, after deducting the waste by ashes, water, and gas, which escapes without being burnt, may be taken at a maximum of 20.30 kil.; the complete combustion of this quantity of coal would raise, in each minute, 1,465 kil. of water, from 0 to 100° centigrade; the increase of temperature which results from the temperature of the air at 322° cent., compared with that produced by the combustion of coal, would be as 92 to 1465, or one-sixteenth. This is the least ratio, the quantity of oxygen being insufficient to transform all the carbon into carbonic acid.

IV. The quantity of combustible matters burnt in the furnaces, appears to be nearly the same where the heated air is used, as before with cold air; the daily consumption at the Clyde being eighteen tons of coke, to obtain six tons of metal; now it is eighteen tons of coal, to produce nine tons of metal.

V. The metal produced in the furnaces worked with heated air, is generally gray, and fit for the foundry; nevertheless, this plan is employed with advantage in the works of which the pig iron is all, or in part, manufactured into bar iron, (Codnor Park, Tyne, Wednesbury, &c.) It is only necessary, for this purpose, to change the proportions of ore and fuel.

VI. In many works, the combustion requires much less heated, than it did cold, air; at the Clyde, for example, the same blast engine which served with difficulty for three furnaces, now blows four. The economy in motive force is not proportional to the diminished quantity of the blast, because a certain power is required to overcome the friction of the air in the heating apparatus, and the resistance which results from the expansion of the air by the heat. This last inconvenience is remedied by increasing the size of the tuyeres, their diameter having been increased from two and a half to three inches; the increased diameter of the tuyeres is also necessary to diminish the velocity of the current of air, when introduced into the furnace.

VII. When, as at Torteron, a diminution in the quantity of air does not result from increasing the temperature, additional power is required to move the blowing machine.

VIII. The substitution of heated for cold air, in the fusion of iron ore, is marked almost immediately by a change in the nature of the metal, which becomes more carbonized; the charges descend more slowly, but the working is accelerated by augmenting the proportion of ore.

Relative to the Apparatus.

IX. The apparatus formed by joining pipes of large diameter, which receive the air, and of small pipes, in which it is heated, and dilated, appears to me to be preferable to that composed of a series of pipes, of great diameter; requiring a smaller space, being less costly in the construction, and consuming less fuel than the last named; besides, the temperature is not uniform in all parts of this apparatus, and a current is usually formed in the centre, of diminished temperature.

X. To diminish, as much as possible, the velocity of the air submitted to the action of the heat, and to avoid the resistance due to its expansion, it is necessary that the surface of the small pipes should be more extended than that of the large pipe which receives the air from the blowing machine.

XI. The interior capacity of the small tubes ought to be greater than the volume of air injected into the furnace; by this disposition, the air remains a longer time exposed to the action of the heat, and acquires a more elevated temperature.

XII. From this last condition, the apparatus placed on the trunnel head appears to be of but little advantage to furnaces using coal; sufficient size cannot be given to it, to enable the air to remain long enough; to remedy this evil, the air is made to pass over another fire placed near the tuyere.

Relative to the Fuel.

XIII. The coals, very rich in coke, which are dry, and resemble anthracite, can be employed in a crude state, in furnaces working even with cold air.

XIV. The coals which contain a large proportion of volatile matters, (30 to 35 per 100,) but which are not very adhesive, and do not change form during combustion, serve, without being carbonized, to work in furnaces using air heated to 300° cent.

XV. It appears, finally, that fat and bituminous coals, like those of Newcastle, which are fit for the fusion of iron, must, even with the hot blast, be transformed into coke.

Extract from the Report of Benjamin Wright, Esq., *Civil Engineer, who was appointed by the Governor to survey the route of the New York and Erie Rail-road.*

(Continued from page 364.)

In carrying the route of the rail-road through the heart of Sullivan county, and thereby giving great and permanent advantages to a large district of country, capable of sustaining a considerable population, I will make this passing remark, that by passing down the valley of the Neversink, from the foot of the Shawangunk mountain, until I reached the valley of the Delaware river, and then passing up the Delaware to the mouth of the Callicoon, I might have found a route of much easier grade, and which would not average over fifteen feet to the mile. But to that plan there are, in my mind, serious objections. 1st. It would be a more expensive line to grade, on account of its passing along steep side hills, and heavy ledges of rocks, requiring expensive rock excavation. 2d. It would not accommodate, or be very useful to, Sullivan county, as the country along the bank of the Delaware is not generally favourable to cultivation. 3d. It might come into collision with the Delaware and Hudson Canal, and perhaps divert some of its legitimate and fair business; and in its construction it might interfere with and injure that important and very useful work, for the execution of which, its enterprising proprietors deserve to be gratefully considered.

The line then passes up the Delaware, from the Callicoon to the village of Deposit, from which a lateral road may easily be extended into the heart of Delaware county. The route then crosses, by a bridge, the main or Mohawk branch of the Delaware, and thence follows up the Oquago creek to its source, on the route towards Betts-

burg, from whence it descends to the Susquehannah, and passing that river near Nineveh, follows up the valley of Belden brook to its source, and then taking the head waters of Page brook, follows that down the Chenango to Binghampton, or its vicinity.

An examination of the maps and profiles will show that several routes have been examined, between the Delaware river, at Deposit, and the Chenango, at Binghampton, and that lines were run on the most favourable ground, on a nearly direct course between Deposit and Windsor, on the Susquehannah, and between Windsor and Binghampton, from the Susquehannah to the Chenango.

Both these summits, however, proved to be considerably higher than those on the route chosen, and they cannot be overcome but by stationary steam power. For a more particular description, in detail, of the diffiulties to be overcome, I refer to the report of Mr. Seymour; and I will only add, that, after having attentively examined these routes, I am decidedly of opinion that the northern route by Bettsburg, and by Nineveh and Page brook, ought to be adopted. That route, moreover, will possess a local advantage of peculiar value, in the facilities it will give to various branch rail-roads leading into the populous and wealthy sections of the state, along the valleys of the Upper Susquehannah, the Unadilla, and the Onondaga branch of the Chenango, and thus accommodating the counties of Otsego, Chenango, and Cortland, and part of the adjacent counties.

When the line came near the mouth of Page brook, on the Chenango, it became a question to determine which side of the Chenango we should pass down to near its mouth. A desire to approach near, and even pass into, the growing and important village of Binghampton, determined me to have the survey made on the east side; but ascertaining that the Chenango canal had not then been finally located, I directed a survey on the west side also, and to pass the river near the mouth of Page's brook. This part of the line I do not consider as settled, neither can it be finally determined until the canal is nearly completed; when that shall be done, we can see if there is a fair chance of carrying our rail-road on the upper side at a reasonable expense; and should this be the case, a preference ought to be given to the east side of the Chenango, so as to approach near to Binghampton, and pass over the river near the upper part of that village.

From the Chenango river, the route, in following down the Susquehanna valley for about forty miles, passes through the flourishing village of Owego, where it will become connected with the steamboat line now in preparation for navigating the Susquehannah, and also with the Owego and Ithaca Rail-road, which will connect the main line with the important and fertile section of the state adjacent to the Cayuga and Seneca lakes. After descending for forty miles along the east branch of the Susquehannah, we approach near the Pennsylvania line, north of Tioga river, (being a large branch of the Susquehannah,) and pass up its valley by Elmira, Big Flatts, and Painted Post, to the forks of the Conhocton and the Canisteo; and

then following up the Canisteo to its source, we pass Hornellsville, Almond, and over the summit between the waters falling into the Susquehannah, and the waters of the Genesee river.

Of nearly 130 miles on the route between the point where we leave the valley of Page brook, and near Almond, the grades are all extremely easy and favourable, or can be made so.

From near Almond, in going on westward, we pass the dividing ridge, where, for the present, we have made our grade line seventy-two feet per mile, but which can be somewhat relieved; and passing down Dike creek, we fall into the valley of the Genessee river, and run down that a few miles, and then up the valley of Van Campen's brook, through the villages of Friendship and Cuba, until we take the valley of Oil creek, then down that to its junction with Ischua creek, and down the valley of Olean creek to the Alleghany river.

Through this district, from the summit between the waters of the Susquehannah and Genesee, and the waters of the Genesee and Allegany, we have some grades which reach fifty feet per mile, as the line is now run; but it is believed that considerable improvement will be made in this part, on a revision of the line.

Having reached the valley of the Alleghany, we pass down it about twenty-six miles, over excellent ground, generally, to the Indian village, near the Cold Spring creek. There, leaving the Alleghany, we pass up the valley of the Cold Spring, and over a small swell of land, and descend into the valley of the Little Conewango, a branch of the Large Conewango; and passing down that stream, and the Large Conewango, passing the village of Randolph, in Cattaraugus county, and the villages of Waterboro' and Kennedysville, in Chautauque county, following down the valley of the Great Conewango to the Casadaga branch, and up that to its junction with Chautauque outlet, we then follow up the Casadaga valley to Bear creek, and up that to near Bear lake; here we arrive at the dividing point between the waters which run southerly into the Alleghany, and those which run northerly into Lake Erie.

At this point, we are only about five miles in a direct line from Lake Erie, and 740 feet above it, and here is a place where we find ground favourable to descend by one plane 506 feet, in a distance of about one and a half miles; and at the foot of this plane we find ourselves nearly equidistant from Dunkirk and Portland.

At Dunkirk, the government of the United States have expended considerable money in the construction of a harbour, and are preparing to expend more. At Portland there has been no money expended, except by individuals. The government of the United States have had a regular survey and estimate of cost to make a harbour. I have obtained plans of each of these places, and return copies of them herewith. It is said that the cost of making a harbour upon the plan reported by Captain Maurice, of Portland, would be forty thousand dollars.

It will be seen by the maps and profiles returned, that a route was surveyed from Randolph, in the county of Cattaraugus, up the valley of the Great Conewango, to its source, and then striking off towards

Dunkirk. This route was tried in order to find a more direct and shorter course to Dunkirk, or to Fayette, at the mouth of Silver creek. This latter place has claims for its natural advantages for a harbour, and probably will receive attention at some future day.

In running the line to the head of the Conewango, and from thence beginning to descend the declivity toward Lake Erie, I was in hopes of finding ground favourable for descending at fifty or sixty feet per mile, and reaching Dunkirk by that grade, and thereby doing away the necessity of stationary steam power, and inclined planes; but I found the whole face of the country so cut by gulfs, and intersected by ridges, that I was defeated in my project, and abandoned it. The plan appears to me to deserve further exploration, before a final decision.

In selecting the Casadaga route, I have considered the advantages of its passing through the centre of the county of Chautauque, and approaching within about three and a half miles of Jamestown, at present the largest of all the towns in this valuable county. Its approximation, also, to the harbours of Portland and Dunkirk, tends to entitle it to a preference, while the strong probability that improvements will soon be made in the Alleghany river, so as to render it at all times navigable for steamboats, and the fact that it may now be navigated during a considerable period in the spring, render it desirable to continue the route as far as practicable down the valley of that stream, and thereby facilitate the direct communication between the city of New York and the great valley of the Ohio. And it ought also to be borne in mind that the construction of the road, as far as this point, will go far to insure its continuation through the western states to the Mississippi river, in which event that great western branch would leave the main line near the mouth of the Casadaga creek.

The total amount of linear extent from the Hudson river to Lake Erie, will be 483 miles, which distance may, however, be shortened from ten to fifteen miles by alterations in the route, which may be found desirable upon a further survey. The curves upon the roads are generally easy, none of them having less than 500 feet radius.

The graduation of the road has been estimated throughout for a double track, including embankments, in all cases, of solid earth, and embracing all necessary bridges, viaducts, and culverts, together with the expenses of grubbing and fencing, comprehending, in fact, the whole cost of the road, except that of superintending, of the damages (if any) to be paid for the land to be taken, and the expenses of the engineer department.

According to the report of Mr. Seymour, the expense of graduation, thus estimated, for the $222\frac{3}{4}$ miles between the Hudson river and Binghampton, will amount to $1,551,982, being $6,968.10 per mile; and according to the report and estimate of Mr. Ellet, the expense of graduation, thus estimated, for the remaining $260\frac{1}{4}$ miles, will be $1,165,536, being $4,478.51 per mile. Total graduation of the 483 miles, $2,717,518, or $5,626.33 per mile, including fencing, clearing in timber land 100 feet on each side, (to prevent trees falling

on the road,) and also all bridges over rivers, viaducts, culverts, road crossings, &c. &c.

Cost of grading as above,	$2,717,518
Add 10 per cent. for contingencies,	271,751
	$2,989,269

The cutting and embankments are all twenty-five feet wide, and the slopes of the embankments are one and a half base to one perpendicular. This I consider as a permanent and solid form, and calculated for stability.

The expense of superstructure will vary according to the particular plan which shall be adopted.

I have caused cross sections of several different roads now completed to be drawn, and have also drawn some which I think well adapted to the country through which the road will pass, for 400 miles, if a wood and iron road is adopted; these may be seen marked No. 5. That marked No. 2, is also of wood and iron, and is the common road as now built between Schenectady and Ballston, and such as will be built between Schenectady and Utica.

Such a road as No. 2, if built of yellow pine and oak, or chesnut, will cost, in Orange or Rockland, about 2830 dollars per mile.

Such as No. 5, will cost about 3400 dollars per mile.

Such as the Camden and Amboy, and the Columbia and Philadelphia road, cost 10 to 12,000 dollars per mile.

The Petersburg and Roanoke cost about 2600 dollars per mile, as I have been informed.

These are all for a single track, with one turn-out or sideling to each mile.

If the sum of $3,400 per mile be taken, it amounts to $1,642,200

	$4,631,469
Add for engineering, &c., 3 per cent. on $4,359,718,	130,791
Total,	$4,672,260

This sum will grade and bridge over rivers the whole road for two tracks, and put down one track, which is all that ought to be done, until the road is travelled nearly its whole length; and this also includes the inclined plane, and steam power to operate upon it, and also a long and expensive wharf into the Hudson river.

These estimates are, in my opinion, liberal, and such as will make an excellent road, and, as I have before observed, there are many places where a great reduction might be made in the expense, by a small alteration of the grade.

The bridges over the large rivers I have also estimated higher than they will cost, if only built without regard to roofing, or otherwise protecting them from the weather. I have considered and planned these bridges to be only sixteen to eighteen feet wide, and so formed as to have a double track over them, but that so fixed as that loaded trains of cars cannot pass each other on those large bridges. I did

not think so much weight as two trains of loaded cars, passing different ways, ought to be permitted to pass on a bridge at the same time. It would perhaps bring fifty tons or more on it at the same moment, which is improper, unless in one long extended train.

I have also estimated one turn-out or sideling to each mile. If locomotive power is used on the long easy grades before mentioned, these turn-outs ought to be dispensed with, and only placed at every five to ten miles, as they are found extremely troublesome when locomotive power is used, owing to the carelessness and inattention in leaving them open, when they ought to be shut. I find that, on rail-roads now in use, the test of experience has shown it necessary to take up turn-outs which had been placed every mile, and only place them once in ten miles, and that at the water stations for the locomotive; and in this case, the man who attends the water stations sees to the turn-out being in its place, whenever the cars are coming in sight.

In making the estimate, I have put down the item of fencing, and also clearing away the timber on each side of the rail-road for 100 feet wide, to prevent trees from falling on the road. These items are of that kind, that, in many instances, there may be arrangements with the owners of property to save some part of the estimated cost.

In the reports of rail-roads which have been constructed and are now in use, the heavy items for pounded stone, which has been used for filling up trenches, have added very greatly to the expense. Experience has, however, satisfied most of the practical engineers, that the road does not stand as well, when laid on broken stone, as when laid on plank or timber, and the estimates have been made on the latter plan.

It is true, that almost every where along the line of this proposed road, there is small flat stone, or gravel, or sand; and, when the plank or scantling are laid in trenches, the small flat stone may be thrown in and rammed down, and they operate as drains to cast off the water from under these timbers into the side drains; and these being properly prepared to take away all water in them, the bed of the road is kept dry and solid.

Although the appearance of the road, as located, is circuitous, the curves have all more than 500 feet radius. As we have run the lines, and probably in making a final line of location, it will be found that the shortest or boldest curve need not be less than 600 feet radius. These are easier curves than some on the important roads now in use in the United States, and I do not consider that any difficulties will arise in locomotive engines turning them.

The report of the engineer on the Eastern Division, will show two routes from the town of Liberty, in the county of Sullivan, to Shohocking, at the junction of the Popacton, or the east branch of the Delaware, with the west branch, in Delaware county.

I have before observed that the route down the Callicoon was preferred, because it had less difficulty as to ascent, and the Beaver Kill route would have one inclined plane, near Young's Gap. This route by the Beaver Kill, is, however, nearly nine miles shorter than the

Callicoon route, and admitting that the tunnels (which are represented) are made, instead of going round the bend at Hawk and Sprague mountains, then the distance will be shortened three miles more, at least, making twelve miles shorter.

But still it appeared, on a comparison, that the saving in ascent and descent, amounting to something more than 300 feet, the easier grading on the Callicoon route, and the easier curves on the line by the Callicoon and Delaware, than on the Beaver Kill route, decided my mind in favour of the Callicoon route, although at increased distance.

The law under which this survey was made, provides that it shall commence at the city of New York, or its vicinity, or at such point as is most eligible and convenient.

The point on the Hudson river where the road would strike, it being still subject to further revision, and knowing that no great difficulties could arise in locating the road through the county of Westchester, the want of time and means prevented my effecting this survey. Considerations of policy would require this piece to be delayed until the other parts shall be in great forwardness, and then it will be made without doubt.

On an effectual method of cutting off the communication between the damp Foundation of a Wall built upon a moist subsoil, and the part of the wall above the ground; and on a mode of securing the inside of a wall from damp forced through the brickwork by driving rains. *By* John Isaac Hawkins, *Esq., Civil Engineer.*

In consequence of reading the excellent paper of Mr. Kent, I am induced to send you an account of the method I took to cure one or two of the evils against which he warns his readers.

Soon after I had taken a lease (ten years since) of the cottage I now occupy, I discovered that the damp ascended the walls to the height of a yard above the ground, and that my furniture began to be injured by mildew. Finding that the foundation was laid upon a subsoil of clay, and knowing that a cure would be effected by interposing a water proof medium throughout the thickness of the wall, just above the level of the ground, I proceeded in the following manner: First, I made a hole through the wall, over the ground course, taking out two courses in height, and two bricks in length; consequently, the hole was six inches high, and eighteen inches wide. I filled up half this hole, at one end, with two courses of sound bricks, laid in Roman cement. It is clear that the operation could not injure the wall, the width of eighteen inches not allowing of any settlement. Two courses more, of nine inches in width, were next removed, making the hole again eighteen inches wide, the half of which was then filled up with bricks and cement, as before. The operation was repeated until the whole of the walls of the house were underpinned by two courses of hard bricks, and three joints of Roman

cement; constituting a water-proof septum, through which the damp cannot rise.

Local circumstances prevented easy access to two or three spots; and, my bricklayer not taking care that there should be three perfect joints of Roman cement in every part, the moisture still rises, in a few neglected places, in a small degree. But, with these few exceptions, the cottage, generally speaking, has been as free from damp, for nearly ten years, as if built upon a dry subsoil. The cost of 120 feet run of wall, for the most part fourteen inches thick, was about £15.

In recommending this plan, I would strongly enforce the necessity of performing the operation under every part of the house, partition walls, and chimneys. I yielded to the fears of my bricklayer, and suffered the stacks of chimneys to remain untouched; the hearths on the ground floors are, therefore, damp, except when a constant fire is kept up. There was, in reality, no danger of any sinking of the stack, as Roman cement, when of good quality, expands in setting, and affords as perfect a support as the bricks and mortar which were taken away, or, rather, a more perfect support than they had afforded.

In building a house on a moist subsoil, where the expense of a water-proof foundation might be an object, a couple of courses of brick, laid in Roman cement, immediately above the level of the ground, would prevent the damp rising above those courses. I have seen a single course of slate used for this purpose with good effect; and that is, perhaps, as impervious to water as three joints of Roman cement.

Mr. Kent's just observations on the absorbing qualities of place bricks are applicable, also, in a considerable degree, to the inferior stocks of which my cottage is built. The outer walls above the first floor are only nine inches thick, and the driving rains used to force the wet quite through them, and through the plasterings, throwing off the papering of the rooms. I cured this evil by scraping off all the plastering inside the rooms, and replacing it by a coat of Roman cement; since which time, no symptoms of damp have appeared on the inside of these walls. [*Loud. Arch. Mag.*

¶ *Bread from Wood.*

Dr. Prout has clearly proved that all the chief alimentary matters employed by man may be reduced to three classes, viz. saccharine, oily, and albuminous substances, the most perfect specimens of which are respectively sugar, butter, and white of egg. The saccharine principle, in its extended sense, includes all those substances which are chiefly derived from the vegetable kingdom, means, in fact, the same thihg as what we call vegetable diet. It comprehends all those substances, whatever their sensible properties may be, into the composition of which hydrogen and oxygen enter in the proportion in which they form water; for example, the fibre of wood, which chem-

ists call *lignin*. Much skilful manipulation and delicacy of experiment were required to establish this result; but the nutritive property of the woody fibre—in short, that a tolerably good quartern loaf can be made out of a deal board—has been proved by the recent labours of a German professor, and may be verified by any one who will take the trouble to repeat them. The following, says Dr. Prout, was the method he employed for this purpose: In the first place, every thing that was soluble in water was removed by maceration and boiling; the wood was then reduced to a minute state of division, not merely into fine fibres, but actual powder; and after being repeatedly subjected to the heat of an oven, was ground in the usual manner of corn. Wood thus prepared, according to the author, acquires the smell and taste of corn flour. It is, however, never quite white, but always of a yellowish colour. It also agrees with corn flour in this respect, that it does not ferment without the addition of leaven; and in this case sour leaven of corn flour is found to answer best. With this it makes a perfectly uniform and spongy bread; and when it is thoroughly baked, and has much crust, it has a much better taste than what, in times of scarcity, is prepared from bran and husks of corn. Wood flour, also, boiled in water, forms a thick, tough, trembling jelly, like that of wheat starch, and which is very nutritious. The nutritious properties were first tried on a young dog; afterwards he fed two pigs upon it; and then, taking courage from the success of the experiment, the professor attacked it himself. His family party, he said, ate it in the form of gruels, or soup, dumplings, and pancakes, all made with as little of any other ingredients as possible; and they found them palatable, and quite wholesome. [*Mech. Mag.*

¶ *Slabs of Slate fixed in a Bed of Concrete, as a Substitute for Granite Sleepers for Iron Rails.*

This plan is in contemplation for the London and Birmingham rail-road, and, with a view to prove the strength of slate so bedded, some experiments were made, July 2, on the premises of Messrs. Cottam and Hallen, in the presence of Mr. Solly, the chairman of the company, Mr. Stephenson, the company's surveyor, Mr. Palmer, the engineer, and other gentlemen; from which it resulted that slate, of a certain thickness, will answer all the purposes of granite, as a sleeper for the rail, at less than half the expense of that material. It was found, by the hydraulic press, that a cubic inch of slate will sustain a pressure of three tons and a half, and that, consequently, slate of an inch and a half thick is more than equal to any pressure which it can be required to support on the rail-road. Slabs of slate, of sufficient size and thickness, may be had for the purpose in abundance, from the quarries in Wales, Cornwall, and Ireland. It will require some ingenuity to fix them in the concrete, so as to prevent them from being shifted from their places by the vibrating motion of the wheels of the engines and wagons. In order to ascertain the best mode of effecting this object, it has been arranged that 300 or

400 yards of the Birmingham and London rail-road should be laid with slate sleepers, in the first instance. [*Morn. Chron.*

Slate has lately been used as flooring for shops in London, and it has also been laid down in the Strand as foot pavement, in order to prove, by experiment, its durability relatively to that of Yorkshire flagstone. Its strength is such, that it might be used in all warehouses, instead of boards for the floors; and thus, by means of cast iron joists, such buildings might be most effectually rendered fireproof. In common dwelling houses, fireproof partitions, and fireproof chests and closets, might be formed of the same material, joined by iron or copper. [*Loudon's Arch. Mag.*

Compositions of Concrete for Foundations.

1. A writer in Loudon's Architectural Magazine states that he has used concrete in the proportion of five of loamy gravel to one of stone lime. Dry brick rubbish may be used with the gravel, or, in fact, any other material, if carefully spread, and used sparingly. These proportions will be found to answer well. This kind of foundation is not very new, for Carter informs us that the foundations of Westminster Abbey, erected 1245, consist of flints, irregular stones, rubble, and mortar, forming together one almost impenetrable body. In many of the ancient remains of castles, particularly in Kent, the foundations are made in this manner. [*L.*

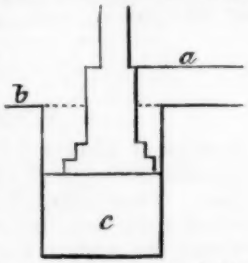
2. A second method of forming this composition, given in the same journal, is the following.

Take Thames washed shingle, and Dorking lime fresh from the kiln, and finely powdered, in the proportion of six bushels of shingle to one bushel of lime, with a due quantity of water. These are to be intimately and properly mixed in small quantities, (say a small barrowful,) and then thrown from a stage at least five feet high, while hot, in equal layers; every layer to be well rammed. [*Reader.*

3. Mr. Thorold states that concrete foundations are usually made with Dorking lime; but he apprehends any water lime will do as well. He adds,—We use, for water-works, lime burnt at Heyden, in this county. There is also a capital lime made at Reach, and at Burwell, in Cambridgeshire, which is used in water-works all over the Fen country; both these limes are sold at the kilns for about 6*d.* per imperial bushel. This is very important, for, with Dorking lime, concrete foundations cost nearly as much as brickwork, all things considered. With regard to the proportions of materials, I should advise experiments to be made with local materials, to determine them. Pieces might be formed of not less than a foot cube, or, what is better, an old tea chest might be filled with them. The lime should be fresh from the kiln. I believe concrete was first suggested by Semple, in his *Treatise on Building in Water;* Dublin, 1777.

4. Whenever I have used concrete in the foundation of buildings, says Mr. Watson, I have had a wide square trench dug out, about

eight inches wider than the lowest course of brickwork, and to such a depth as to insure a tolerably firm foundation. The annexed figure will show this more distinctly. In this figure, *a* is the floor line; *b*, the ground line; and *c*, the concrete. When the trench is made, I have coarse and fine gravel thrown into it together, (just as they come from the pit,) to a thickness of about four inches; I then have it grouted with thin hot lime, only just enough to bind the gravel together. The mixture must now be rammed down hard. Course after course must then be laid, and so treated, till the mass reaches to within about eighteen inches of the ground line. The proportion of hot lime to the gravel is about one-eighth part only, which I think is enough. It was Walter's Sutton flare-burnt lime which I used. I think this plan better than first mixing the gravel and lime, but this may be a mere matter of opinion. The mixture hardens in a few days, in the most complete manner. After the brickwork is built on it, immediately fill the sides of the trench with earth, ramming it in well, to prevent the rain from affecting the concrete. [*Ib.*



¶ *Origin of Mouldiness.*

"Water, which holds organic substances in solution, very frequently developes living beings, viz: the *infusares*, which belong sometimes to the animal, and sometimes to the vegetable, kingdoms. These substances, which have been regarded by certain naturalists as the product of spontaneous generation, ought to be considered with greater propriety as owing their appearance to the development of certain invisible germs, which are scattered throughout nature with profusion, and which only require favouring conditions to assume their being, and to develope themselves." "I have completely satisfied myself that mouldiness is the growth in air of aquatic filamentous vegetables. I have seen, in the most distinct way, the aerial filaments of the mould springing from the stalks of the aquatic filamentous vegetables, sometimes by a production from the side, and sometimes by the sprouting out of the extremity of one of these aquatic filaments, which, in coming into the air, become, by that alone, a filament of mould." "I dissolved a drop of the most liquid portion of the albumen of a new laid egg in an ounce of water, and put it into a flask. This liquid was preserved for a whole year, exposed to the light and put into the dark, but it never exhibited the least trace of mould. It did not even develope a single atom of greenish matter." "A drop of acid in an ounce of water, produced mould in eight days. Mercury, whether in the state of salt, or of an oxide, completely obstructs the appearance of mould."—*M. Dutrochet, in the Edin. Phil. Jour.*

If the albumen of the egg so completely prevents mouldiness in water, might not this fact be taken advantage of in preserving in a sweet state the water on board ships? Albumen is not only harmless, but nutritive, and eggs are very cheap.—W.

[*Lond. Mech. Mag.*

¶ *New Material for Cables.*

A series of trials have lately been made at Paris, to ascertain the comparative strength of cables made of hemp, and of the aloe from Algiers. These trials all turned to the advantage of the aloe. Of cables of equal size, that made of aloe raised a weight of 2000 kilogrammes, that made of hemp a weight of only 400 kilogrammes.

[*Ibid.*

List of American Patents which issued in April, 1835.

		April
163.	*Pens, steel, or metallic.*—Peregrine Williams, city of New York,	1
164.	*Pump, inflating.*—C. Goodyear, and C. Cusler, city of Philadelphia,	1
165.	*Horse power.*—Daniel Pennepacker, Upper Providence, Penn.	1
166.	*Cotton and rice hulling.*—Jirah Kellogg, New Hanover, N. C.	1
167.	*Power augmenting machine.*—Andrew Oehler, Baltimore city,	1
168.	*Thrashing machine.*—Wm. W. Ross, Chillisquaque township, Pa.	1
169.	*Doors and gates, closing.*—Oliver Davidson, Ballston Spa, New York,	1
170.	*Galvanic apparatus, &c.*—Daniel Harrington, city of Philadelphia,	2
171.	*Steam, regulating.*—Jesse Fox, Lowell, Mass.	4
172.	*Temperature of rooms.*—B. Seymour and S. Whipple, Utica, N. Y.	4
173.	*Washing machine.*—Luther Carman, Oxford, Maine,	4
174.	*Pumps, constructing.*—Heinrich Bachmann, Lancaster, Pa.	4
175.	*Straw cutter.*—John Deakyne, Petersburg, Va.	4
176.	*Grist mill.*—Cephas Manning, Littleton, Mass.	4
177.	*Cooking stove.*—Andrew Abbott, Portland, Maine,	4
178.	*Papillary shield.*—William Buxton, Woburn, Mass.	4
179.	*Wheels and axletrees.*—A. Hall, Boston, Mass.	4
180.	*Spindle for yarn.*—C. Jackson, S. Potter, and J. Miller, Providence, Rhode Island,	4
181.	*Truss and appendages.*—J. W. Hood, Clarke county, Kentucky,	4
182.	*Water wheels.*—Alvin and Barton Darling, Billingham, Mass.	4
183.	*Combs.*—George Hooker, Bristol, Conn.	4
184.	*Thrashing machine.*—William G. Johnston, Bridgetown, N. Jersey,	4
185.	*Grist mill.*—Elisha Holton, Westminster, Vermont,	4
186.	*Locomotives, wheels, &c. for*—Matthias W. Baldwin, city of Philad.	4
187.	*Turning irregular forms.*—C. Whipple, J. Sprague, and M. D. Whipple, Douglass, Mass.	4
188.	*Palm leaf mattresses.*—Joseph C. Smith, Cambridgeport, Mass.	4
189.	*Saw mill blocks.*—Benjamin F. Snyder, Painted Post, New York,	4
190.	*Iron chests.*—Charles J. Gayler, city of New York,	4
191.	*Bridge.*—Ithiel Town, city of New York,	4
192.	*Screw press.*—Thomas Gilpin, Wilmington, Del.	4
193.	*Thrashing machine.*—Samuel S. Allen, Saratoga Springs, New York,	4
194.	*Horse power.*—Samuel S. Allen, Saratoga Springs, New York,	4
195.	*Chimneys, constructing.*—Bacon & Harris, Boston, Mass.	10
196.	*Mortising window sash.*—Charles Rinehart, Lancaster county, Pa.	10

		April
197.	*Brick pressing machine.*—Nathan Sawyer, Knox county, Ohio,	10
198.	*Thrashing machine.*—Henry Heberling, Harrison county, Ohio,	10
199.	*Horse power.*—John Brandon, Williamsport, Pa.	10
200.	*Mortising machine.*—Erastus M. Shaw, Brooklyn, New York,	10
201.	*Auger for large holes.*—N. J. Lampman, Coxsackie, New York,	10
202.	*Galvanic apparatus.*—Daniel Harrington, city of Philadelphia,	10
203.	*Power loom.*—Wm. G. Gavitt, Washington county, Rhode Island,	10
204.	*Straw, spinning.*—Philo G. Sheldon, Winchester, Conn.	10
205.	*Saw mill carriage.*—Henry Gordon, Adams county, Pa.	10
206.	*Metallic shingle.*—Southwick & Richardson, Palmyra, New York,	10
207.	*Lamps, composition for*—Henry Porter, Bangor, Maine,	10
208.	*Steam, generating.*—Wm. Scarborough, Savannah, Geo.	10
209.	*Propelling boats.* " " "	10
210.	*Balance.*—N. Griffing, city of New York,	10
211.	*Rice cleaner.*—Wm. Scarborough, Savannah, Georgia,	14
212.	*Truss for hernia.*—B. M. Smith, Tompkins county, Georgia,	14
213.	*Cooking stove.*—T. Fairbanks, Caledonia county, Vermont,	14
214.	*Tanning hides.*—J. Lippincott and J. Hillyer, Philadelphia,	14
215.	*Blacking boots.*—John Folsom, Hallowell, Maine,	14
216.	*Tanning hides.*—Isaac M. Belote, Fayette county, Tenn.	14
217.	*Marine railways.*—W. Van Dusen, Kensington, Penn.	14
218.	*Hair Brushes.*—J. B. Burgess, city of New York,	14
219.	*Grist mill.*—Peter M. Wright, city of New York,	14
220.	*Friction, diminishing.*—P. Hinkley, Kennebec county, Maine,	14
221.	*Window, &c. bolts.*—M. Merriman, New Haven, Conn.	14
222.	*Horse power.*—Webber Furbish, Hallowell, Maine,	14
223.	*Feather cleaning machine.*—Orestes Badger, Otsego county, N. Y.	22
224.	*Reflector for cooking.*—John Burch, Jefferson county, New York,	22
225.	*Stoves and grates.*—Elkanah Ingalls, Providence, Rhode Island,	22
226.	*Hemp breaking machine.*—Ferdinando Stith, Franklin, Tenn.	22
227.	*Dry dock for ships.*—Jonathan Hawes, Cayuga county, New York,	22
228.	*Rolling machine.*—Isaac Hinman, New Haven, Conn.	22
229.	*Carpenters' rules.*—Lemuel Hedge, Brattleborough, Vermont,	22
230.	*Weighing machine.*—J. B. Maag, city of New York,	22
231.	*Tobacco pressing, &c.*—Emanuel Showler, Richmond, Virginia,	22
232.	*Kitchen rangers.*—Eliphalet Nott, Schenectady, New York,	22
233.	*Furnace and boiler.* " " " "	22
234.	*Box cook stove.* " " " "	22
235.	*Hoes, making.*—Isaac Hinman, Camden, Conn.	22
236.	*Printing press.*—J. L. Kingsley, city of New York,	22
237.	*Rotary pump.*—Isaac Hall, Poughkeepsie, New York,	22
238.	*Fur cloth.*—Allen Belden, Hudson, New York,	22
239.	*Cutting grain and grass.*—Abraham Randel, Verona, New York,	22
240.	*Friction bushes.*—L. Aspinwall, Albany, New York,	22
241.	*Loom for figured work.*—John Smith, Shaefferstown, Penn.	22
242.	*Bedstead.*—B. F. Berry, Utica, New York,	22
243.	*Paris white, making.*—Peter Ferris, Greenwich, Conn.	22
244.	*Churn.*—Samuel Clark, Parkman, Maine,	22
245.	*Hame collars, blocking.*—Melvin Eddy, Adams, New York,	22
246.	*Cheese making machine.*—Henry Weber, East Richfield, New York,	22
247.	*Thrashing machine.*—James Whitehill, Frederick county, Md.	22
248.	*Lever and crank machine.*—E. T. Merrill, Parkman, Maine,	22
249.	*Straw cutter.*—John W. Cope, Franklin, Tenn.	22
250.	*Bee hive.*—Orlando Mack, Gilsum, N. H.	24

CELESTIAL PHENOMENA, FOR JULY, 1835.

Calculated by S. C. Walker.

Day.	H'r.	Min.				
4	7	49	Im.	y Virginis,	,6,7,	N. 109° V. 118°
4	8	36	Em.			185° 205°
5	9	21	Im.	,' Libræ,	,6,	112° 129°
5	10	12	Em.			194° 229°
11	12	39	Im.	35 Capricorni,	,6,	76° 58°
11	13	47	Em.			328° 325°
14	14	10	Im.	Piscium,	,4,5,	111° 139°
14	15	30	Em.			325° 211°

Meteorological Observations for March, 1835.

Days.	Moon.	Therm. Sun rise.	Therm. 2 P.M.	Barometer. Sun rise.	Barometer. 2 P.M.	Wind. Direction.	Wind. Force.	Water fallen in rain.	State of the weather, and Remarks.
				Inches	Inches			Inches.	
1	☽	3°	19°	30.20	30.24	W.	Moderate.		Clear day.
2		7	23	.30	.30	SW.	do.		Clear day.
3		13	19	.30	.34	W.	do.		Clear day.
4		5	32	.45	.50	W.	do.		Clear day.
5		14	30	.47	.47	E.	do.		Hazy—clear.
6		16	37	.30	.35	SE.	do.	0.72	Cloudy—rain.
7		30	32	29.93	29.75	NE.	do.		Clear—highly cloudy.
8		32	42	.80	.93	NW.	do.		Sleet—rain.
9		32	43	30.00	.93	SE.	Calm	1.80	Rain—sleet—hail—snow, 10 to.
10		31	32	29.73	.69	E.	do.		Lightly cloudy—hazy.
11		32	43	.86	.95	W.	do.		Clear day.
12		29	47	30.14	30.14	W.	Moderate.		Clear day.
13		37	55	29.65	29.65	W.	do.	0.09	Clear—rain.
14		32	52	.90	.90	W.	do.		Lightly cloudy—flying clouds.
15	☉	37	57	.65	.47	Variable.	do.	0.04	Rain—showery.
16		43	57	.57	.54	S. SW.	Variable.		Clear day.
17		47	47	.46	.20	W.	Blustering		Lightly cloudy.
18		23	41	30.16	30.14	NE.	Moderate.		Drizzle—flying clouds.
19		32	43	29.45	29.45	W.	Blustering		Clear day.
20		32	54	30.00	30.00	SW.	Moderate.		Cloudy—hazy.
21		42	64	29.75	29.70	SW.	do.	0.75	Rain—snow in night.
22		37	35	.40	.20	E. N.	Variable.		Flying clouds.
23		26	31	.45	.70	W.	Blustering		Cloudy—flying clouds.
24		29	44	30.20	30.30	SW. SE.	do.		Clear day.
25		32	50	30.25	.25	SW. SE.	Moderate.		Cloudy—hazy.
26		40	60	.30	.16	SW. W.	do.	0.15	Drizzle—cloudy.
27		50	69	29.95	29.95	W.	do.		Cloudy—hazy.
28		47	62	.75	.65	Variable.	do.		Lightly cloudy.
29		30	51	.60	.60	NW.	Blustering		Flying clouds.
30		39	43	.60	.60	Variable.	do.		Clear day.
31		36	55	.60	.56	Variable.	do.		
Mean		30.55	43.61	29.89	29.90			3.55	

Thermometer.

Maximum height during the month, 64. on 21st,
Minimum do. . 3. on 1st.
Mean do. . 37.08 .

Barometer.

30.50 on 4th.
29.20 on 22d.
29.89

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AMERICAN AND OTHER PATENTED INVENTIONS

EDITED

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